TEXAS EXTENSION AGENTS' PERCEPTIONS OF ORGANIC AGRICULTURE AND ITS IMPLICATIONS FOR TRAINING

A Dissertation

by

PATRICK TERRELL LILLARD

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2011

Major Subject: Agricultural Leadership, Education and Communications

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Approved by:

Chair of Committee,	James Lindner
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ABSTRACT

Texas Extension Agents' Perceptions of Organic Agriculture and Its Implications for Training. (August 2011)

Patrick Terrell Lillard, B.A.; M.S., Texas A&M University

Chair of Advisory Committee: Dr. James Lindner

The purpose of this study was to determine Texas AgriLife Extension agents' perceptions of organic agriculture (OA) and implications for training. Primary variables of interest included level of interest in OA in their respective counties, previous training received, interest in future training, perception of OA and Texas AgriLife Extension's involvement in OA. A random sample of agents was selected (n = 151) and a response rate of 81.5% was achieved.

A majority of agents indicated interest in OA in their respective counties had increased over the past five years (n = 60), but noted demand was still low (n = 39) to moderate (n = 42). Agents from urban or suburban counties reported higher levels of interests in OA than did agents from rural counties. Agents were most interested in training on organic soil fertility, insect, weed, and disease management and least interested in training on organic certification and transitioning to OA. Agents indicated traditional information resources would be the most useful delivery methods for communicating information about organic farming, which included print publications, a website with organic information and extension workshops. Agents' perceptions of OA

and their perceptions of Texas AgriLife Extension's involvement in OA were measured using attitudinal statements using a five point summated scale with reliability estimates r = 0.76 and 0.76 respectively. It was found that agents neither agreed nor disagreed with statements affirming the viability of OA (M = 2.80) and statements advocating Texas AgriLife Extension's involvement in OA (M = 3.38). A stepwise multiple regression was run on the primary variables of interest to determine which variables predicted agents' interest in training. Perceptions of Texas AgriLife Extension's involvement, perceptions of OA, and current level of interest in their county accounted for over 50% of the variability. This research concluded that due to agents' general ambivalent attitude toward OA, Texas AgriLife Extension administration will need to advocate more training and programming in OA if they wish to increase their role in OA. For there to be any significant change in the advancement of OA, though, it will require a paradigm shift in the land grant university system (LGUS).

For Aime and Rori…

On to the next stage in our lives.

ACKNOWLEDGEMENTS

I could not have accomplished this endeavor without the support and assistance from numerous people. I am grateful for my committee for their unending support throughout the process, each contributing in their own unique way. Their mentorship and guidance helped me accomplish this feat.

Many individuals aided in the development and execution of this research. I'd like to thank Dr. Doug Constance, Betsy Levy, Janet Laminack, Shari Grahmann, Dr. Gilbert Gillespie, and Taylor Reid for their assistance in the review and recommendations during the development of the survey instrument. I'd also like to thank Drs. Chandler, Dozier, Ensor, Gibbs, and Woolley in their assistance in gaining Extension Agent participation in this study.

This study was part of an initiative by the Texas AgriLife Extension's Organic Working Group and I appreciate their guidance and support throughout this research. Robert Richter and Dr. Joseph Masabni were both instrumental in implementing and completing this research. I hope we were both able to accomplish our goals with this study and can use the results to increase Texas AgriLife Extension's involvement in organic agriculture. I'd also like to thank my work supervisor, Dr. Masabni, for his persistent encouragement and support. He made it a priority for me to accomplish this research and helped in any way he could.

Writing a dissertation is an extremely difficult task, but the University Writing Center helped me slay the monster. Their dissertation workshop provided the supportive

environment I needed to work through the most difficult sections. Candace Schaefer and Ashley Smallwood read more of my ramblings than I wish upon anyone. Thank you for helping me turn those ramblings into a dissertation.

I also want to express my gratitude to my parents. They have seen me at my best and worst, and have supported me in whatever I chose to do. Thank you.

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CHAPTER I

INTRODUCTION

Texas is one of the nation's leading agricultural producing states. It ranks as the second largest state in market value of agricultural products with an annual market value of more than $21 billion (USDA, 2008). It leads the nation in cattle and cotton production, ranks eighth in national vegetable production, and is among the top five states in the production of cantaloupe, carrots, chili peppers, honeydew, watermelon, onions, and spinach (USDA, 2008). There are more than 247,000 farms and ranches in Texas producing these agricultural commodities, and the number continues to grow (Figure 1) (USDA, 2008). While agriculture in Texas is increasing, it has not taken much

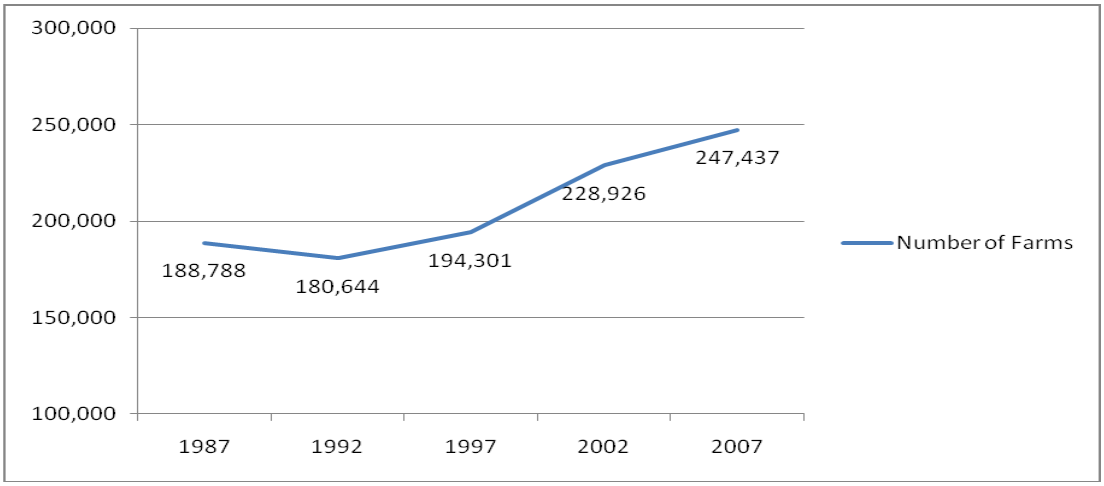

Figure 1. Number of Farms in Texas, 1987 – 2007. Adapted from USDA (2008).

This dissertation follows the style of the *Journal of Agricultural Education*.

of a part in organic agriculture, the fastest growing national market in the agricultural industry.

Over the past three decades, demand for organic products has drastically increased. The market for these products has increased by 15% to 21% annually for the past ten years, with retail sales of organic products increasing from $3.6 billion in 1997 to $21.1 billion in 2008 (Dimitri & Oberholtzer, 2009). Fruits and vegetables have consistently been the largest selling organic product, accounting for over one third of all retail sales (Dimitri & Oberholtzer, 2009). While the demand for organic products has drastically increased, organic production has not.

There are 209 million farms in the United States with almost 1 billion acres under production (USDA, 2008). In 1997, 1.3 million acres were under organic production (USDA, 2008). Over the past ten years, this number has increased to a little more than four million acres, but land under organic production still only accounts for 0.4% of all agricultural land in the United States (USDA, 2008). In Texas, the lack of organic production is even more striking. Of the 247,000 farms in Texas only 660 farms indicated they were using organic practices (USDA, 2008). These 660 organic farms in Texas accounted for 0.1% of agricultural land in Texas (USDA, 2008). In comparison, in 2004, 4% of the European Union's available agricultural land was under organic agricultural production, with some regions having as much as 30% (Padel & Lampkin, 2007). Many of the governments in the EU encouraged the adoption of organic agriculture (OA) through governmental policy and subsidies. In contrast, the U.S. government's stance was to develop the USDA’s National Organic Program (NOP) and

organic certification and let market mechanisms advance OA (Constance & Choi, 2010). It took the NOP over a decade to create standards and establish organic certification in the U.S. Organic certification did create a premium for certified organic products, but it did not persuade many conventional farmers to endure the process of transitioning to OA in order to earn those premiums (Constance & Choi, 2010). The federal government did not financially support the transition to organic agriculture and the land grant university system (LGUS) did not provide any information or resources on how to transition. In 1997, the Organic Farming and Research Foundation (OFRF) conducted its third national survey of organic farmers and found "uncooperative or uninformed extension agents" to be the second largest constraint to organic production (Walz, 1999). In this same survey, farmers were asked to rank the information sources they used most for information on OA. Of the twelve resources listed, cooperative extension advisors was ranked tenth (Walz, 1999).

A recent study by Constance and Choi (2010) sought to better understand the barriers to adoption of OA in Texas. They found that more than 40% of farmers currently operating conventional farms had at least some interest in OA, and some of the primary obstacles to adoption were lack of governmental and LGUS support, uncertainty of gaining price premium, and complexity of OA as an innovation. Constance and Choi (2010) concluded that in order to increase adoption of OA in Texas, institutional support needs to be increased, including support from LGUS and the extension service. They wrote that "because organics is mostly a software or knowledge-based type of innovation, it is heavily dependent on the quantity and quality of support information,

information that is often lacking from traditional sources such as extension services and universities" (p. 170). In order to provide this level of information, Texas AgriLife Extension Service (TAES) will need to examine its current involvement and capacity related to OA.

Statement of the Problem

Texas is one of the leading states in agricultural production, ranking second in agricultural production, and while its share of organic agricultural production is increasing, it has not been able to keep up with demand. In order to increase the amount of organic agricultural production in Texas, the number of barriers to adopting OA needs to be addressed. As Constance and Choi (2010) noted, one of these barriers is access to information. TAES administration has noted the growing need and demand for information on OA, and developed the Organic Working Group to address this issue. The working group established four goals, with the highest priority goal being to assess county extension agents' (CEA) needs for information on OA, and the resources they need to meet the demand (J. G. Masabni, personal communication, September 10, 2010). As the results of this study would be used to develop training programs for CEA, it is also necessary to evaluate CEA's perceptions of OA, as Agunga (1995) noted that "planning a training program in sustainable agricultural education requires measuring the attitudes and perceptions on this subject of those to be trained" (p. 172).

Sanderson (2004) conducted a study in Florida on CEA's level of knowledge and confidence, attitudes, and their intent to conduct programming related to OA, but her

study was limited to self-selected CEA participating in a workshop on OA (n=24). The research reported here examined similar constructs, but extended the population to a representative sample of CEA in Texas, and assessed the current and potential capacity for CEA in Texas to provide programming and information related to OA.

Numerous studies have been conducted on CEA's knowledge of and perception of sustainable agriculture (SA), but very few have looked at OA. OA has the longest history of any alternative agriculture and is the only internationally regulated form of agriculture. In the US, "the NOP, and its protocol for the USDA certified-organic label, is the only government sanctioned measure of sustainable agriculture in the U.S." (Constance & Choi, 2010, p. 164). This distinction should emphasize the importance and significance of OA.

Meetings with the co-chairs of the TAES organic working group and a review of the literature led to the establishment of the following areas for research were established: (a) the level of demand CEA are receiving for information on OA, (b) the amount of training CEA have received related to OA, (c) CEA's interest in training on OA, (d) CEA's perceptions of OA, and (e) CEA's perceptions of TAES' involvement in OA.

Purpose and Objectives

The purpose of this study was to determine Texas AgriLife Extension agents' perceptions of organic agriculture and its implications for training. In order to evaluate

their perceptions of OA and develop recommendations for CEA training, the following objectives were researched:

1. Describe the personal characteristics of TAES CEA.
2. Determine the level of demand CEA are receiving for information on OA.
3. Determine the level of training CEA have received and their interest in future training on OA.
4. Determine CEA's perception of OA.
5. Describe CEA's perceptions of TAES' involvement in OA.
6. Determine what significant relationships exist between CEA personal characteristics, interest in training, and perceptions of OA, and perceptions of TAES involvement in OA.
7. Determine which variables predict CEA's perceptions of OA.
8. Determine which variables predict CEA's perception of TAES' capabilities and role in relation to OA.
9. Determine which variables predict CEA's level of interest in training in OA.
10. Determine if any statistically significant differences exist between personal characteristics on the primary variables of interest.

Theoretical Framework

This research was grounded in both agricultural education and adult and extension education. Barrick (1989) defined agricultural education as "the scientific study of the principles and methods of teaching and learning as they pertain to

agriculture" (p. 26). This field is the intersection of agriculture and education, of teaching and learning in the context of raising plants and animals for use by mankind. Agricultural extension is also education in the context of agriculture, but distinguishes itself by defining its primary audience as the adult learner (van den Ban & Hawkins, 1996). The adult learner has different characteristics and different educational requirements than other audiences. The six basic principles that distinguish adult education, or andragogy, from pedagogy, as set forth by Knowles, Holton and Swanson (2005) are the learner's: (a) need to know, (b) self-concept, (c) past experiences, (d) readiness to learn, (e) orientation to learning, and (f) motivation to learn. These principles apply to all adult education, including CEA training.

While andragogy explains principles influencing adult learning, social psychology has tried to explain factors influencing human behavior. This research applied current theory in social psychology in order to better understand current and future CEA behavior. Ajzen and Fishbein (1980) delineated the theory of reasoned action which describes the processes influencing an individual's behavior. They theorized that, assuming humans are acting on their own free will and typical rational behavior, they will systematically decide to perform or not perform an action based on the information available to them and the perceived consequences of their actions. Fishbein and Ajzen (1975) found this theory to function on two major factors influencing an individual's behavior: behavioral beliefs and normative beliefs (Figure 2). Behavioral beliefs are rooted in the individual's perceived implications of that action, their perception of and attitude toward the prospective behavior, and the perceived

consequences of that action. Normative beliefs are related to perceived social implications of the action, the influence of peers and other opinions they may esteem. One limitation to reasoned action, though, is the assumption of rational behavior. In Sapp's (2002) analysis of behavior related to health, he found a lack of knowledge, or incorrect knowledge, can cause nonrational behavior.

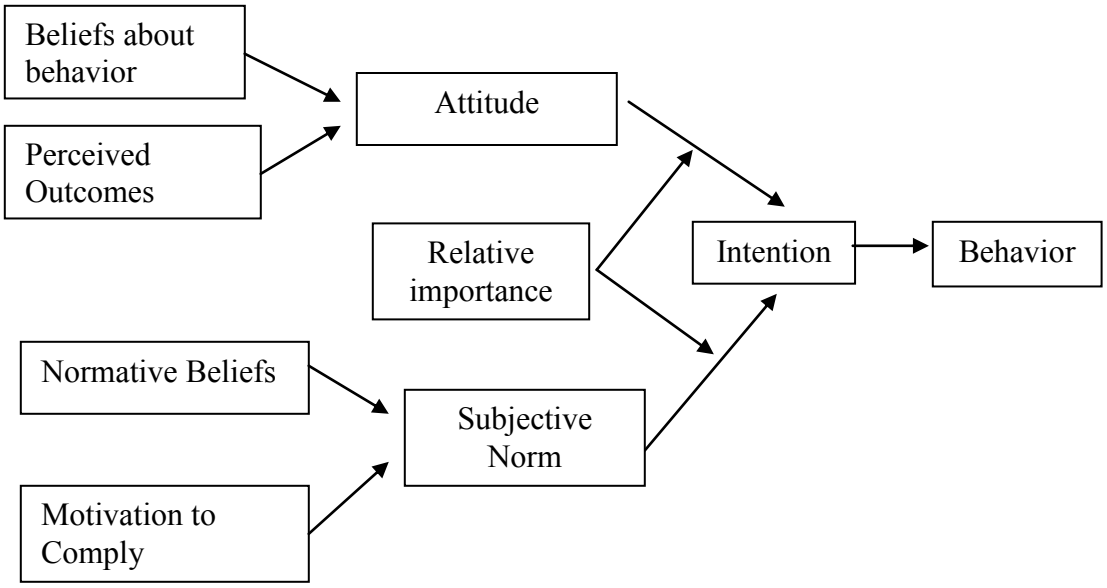

Figure 2. Factors Determining a Person's Behavior. Adapted from Ajzen & Fishbein (1980).

This research applied the theory of reasoned action to determine which variables predict CEA's interest in training in OA. This study intended to determine if respondents' interest in training and readiness to learn about OA could be established by examining their perception of OA, their perception of the relative importance of

information on OA in their county, and their perception of TAES' role and involvement in OA.

Significance of This Study

The results of this research may have both academic and practical significance. Previous studies have primarily examined CEA's perceptions and attitudes related to SA, which were limited by the confusion surrounding the concept of SA (Agunga, 1995; Conner & Kolodinsky, 1997; Jayartne, Martin, & DeWitt, 2001). This research examined CEA's perceptions of OA, which has a distinct and regulated definition and a list of allowed practices, and the influence CEA's perceptions of OA have on their interest in training.

The anticipated application of this research will be in the use of developing professional development and training programs in OA for CEA. This research will provide TAES with an assessment of the demand for information on OA, CEA's capacity to meet this demand, and assist in creating targeted programming. The results of this research will provide recommendations for the design of the CEA professional development training grounded in current adult theory. OA does not fit the traditional transfer of knowledge model, and may require CEA to develop new skills in facilitating the learning process (Agunga, 1995; Constance & Choi, 2010; Jayaratna, Martin, & DeWitt, 2001).

Definition of Terms

Attitude – "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Fishbein & Ajzen, 1975, p. 10).

Dominant social paradigm – the social norms, beliefs and views held by the prevailing group in a society (Pirages & Ehrlich, 1974).

Extension Agent – educators employed by extension and assigned to a county or region, and charged with the responsibility of providing science-based information to their constituents who are primarily adults (van den Ban & Hawkins, 1996).

Industrial agriculture – an agricultural production system characterized by large, highly specialized and highly mechanized operations requiring large amounts of capital for off-farm inputs such as synthetic fertilizers, pesticides, equipment, and feed (Beus & Dunlap, 1990; Ikerd, 1993).

Organic agriculture – ""a system that... respond[s] to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity" (USDA, 2010, Welcome to the National Organic Program, ¶ 1).

Paradigm – a society's norms, beliefs and values in the context of their environment (Pirages & Ehrlich, 1974).

Abbreviations

CEA	County Extension Agents
DSP	Dominant social paradigm
IA	Industrial Agriculture
LGUS	Land Grant University System
NOP	National Organic Program
OA	Organic Agriculture
OFRF	Organic Farming Research Foundation
SA	Sustainable Agriculture
TAES	Texas AgriLife Extension Service
USDA	United States Department of Agriculture

Limitations of Study

This study examined CEA's perceptions of OA, which unlike SA has a distinct definition and list of regulated practices. This research, though, is limited to CEA's knowledge of this definition and practices. The target population for this study was Texas CEA involved in agriculture and natural resource programming areas and generalizations to CEA in other states and programming areas should be discouraged. This research also took place during reductions in force, which could have potentially influenced CEA responses.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to determine Texas AgriLife Extension agents' perceptions of organic agriculture and its implications for training. While there has been research on CEA's perceptions, attitudes, and information needs related to SA, little research has been conducted on their attitude and information needs related to OA, and its influence on readiness to learn. Literature was reviewed on the development of industrial agriculture (IA) and OA, CEA's attitudes and perceptions of alternative agriculture, and theories on the relationship between attitude/behavior advanced in educational and social psychology. The review of literature consists of four primary sections: (a) the development of two paradigms in agriculture over the twentieth century, (b) barriers to the adoption and diffusion of OA, (c) CEA's attitudes and level of knowledge of alternative agriculture, and (d) the influence of attitude on readiness to learn.

Agriculture in Transition

Before the twentieth century, farms were self-sufficient units, relying on management practices and available resources to produce crops. They worked within biological and ecological cycles and recycled on-farm inputs for the production of crops (Kristiansen & Merfield, 2006). Abolition of slavery, mechanization of agriculture, and development of synthetic fertilizers and pesticides all led to the industrialization of

agriculture (Hurt, 2002; Korcak, 1992; Kristainsen & Merfield, 2006). Agriculture shifted from a model of self-sufficiency to one of commercial production. As Hurt (2002) reported:

> One Populist spoke for all farmers when he wrote that self-sufficiency "requires the farmers to step out of the line of progress, to refuse to avail themselves of the industrial improvements of the nineteenth century, turn back the wheels of civilization three thousand years, become a hermit and have nothing to do with the outside world." (p. 216)

As any other business or industry, agriculture was evolving, increasing in productivity and efficiency. At the beginning of the twentieth century 41% of the U.S. workforce was involved in agriculture, but by the end of the century this figure was less than 2% (Dimitri, Effland, & Conklin, 2005). Between 1935 and 2000, the average yield per acre increased annually by 2.1% (NRC, 2010). These advances were accomplished through increased mechanization and specialization of agriculture and increased use of off-farm inputs such as synthetic fertilizers and pesticides (Hurt, 2002; NRC, 2010).

Certain segments of the population opposed the increasing industrialization and specialization of agriculture and its detrimental effects on the land and rural society. Farmer-based organizations such as the Land Reform Movement in Germany, the Soil Association in England, and the Soil and Health Foundation in the United States formed, opposing the changes occurring in agriculture. They opposed the use of synthetic fertilizers and pesticides, arguing that compartmentalized and reductionist science that developed them was detrimental to a farm ecosystem (Stinner, 2007). Advocates of OA

supported a different agricultural philosophy with a more holistic perspective. They saw the farm as an organic whole, an interconnected system of biological cycles creating a "balanced, yet dynamic living whole" (Scofield, 1986, p. 4). However, faculty and staff of the LGUS perceived organic farmers as "laggards" refusing to adopt new agricultural technologies. As Rogers noted in one of his case studies, though, these organic agriculturists were pioneers in the OA movement: "the organic farmer I interviewed in the Collins study has had the last laugh over agricultural experts. My 1954 research classified him as a laggard. By present-day standards he was a superinnovator of the then-radical idea of organic farming" (Rogers, 2003, p. 194).

These two opposing viewpoints, that of industrial agriculturists and that of organic agriculturists, held drastically different perspectives on agricultural practices and philosophies and came to constitute two opposing paradigms.

Paradigms

Kuhn (1977) first used the term paradigm to describe a scientific community and their shared elements. Kuhn contended that scientific discoveries and theories are not developed by isolated individuals separate from their situation in time, but rather take place in the context of and are established by a scientific community. Pirages and Ehrlich (1974) furthered this line of thought by extending the concept of paradigms to society. They defined a social paradigm as a society's norms, beliefs, and values in the context of their environment. They contended a social paradigm specifies "the bounds of appropriate social behavior, highlights social problems in need of solution, creates

shared expectations that make social life possible, and makes some order out of an otherwise incomprehensible social universe" (Pirages & Ehrlich, 1974, p. 234). These social norms, beliefs and views are transferred to following generations through the socialization of individuals and are vital to societies in order to maintain stability.

A society may hold many different beliefs and viewpoints, but there is one paradigm that predominates, which Pirages and Ehrlich (1974) termed the dominant social paradigm (DSP). This DSP is not necessarily held by a majority of the society, but is maintained by the dominant group in the society (Cotgrove, 1982). Pirages (1994) correlates the DSP to the genetic evolution of a species but with one primary exception. Unlike the callous evolution of a species, humans have the ability to purposely alter their base of knowledge and information in order to avert a future crisis or tragedy. A shift in DSPs does not occur often, though. In the history of mankind it has happened only a few times with the most recent shift being the industrial paradigm.

Industrial Agriculture: The Dominant Social Paradigm in the 20th Century

One of the primary guiding theories in agriculture for centuries was the humus theory, which stated that plants derived their nutrients from the humus and organic matter in the soil, and by increasing these components fertility was increased (Korcak, 1992). In the eighteenth century, though, a revolution occurred in agricultural science. Sprengel and Liebig refuted the humus theory and, instead, contended that plants utilize nutrients in the form of minerals in the soil. This new theory was the origin of soil

chemistry, and it, along with the Law of the Minimum, was the beginning of a new DSP in agriculture (van der Ploeg, Böhm, & Kirkham, 1999).

Sprengel and Liebig's discoveries allowed for the industrialization of agriculture through the development of synthetic fertilizers. Synthetic fertilizer created a form of nutrients readily available to plants, and reduced the volume and weight of plant nutrients by twentyfold, allowing for more efficiency in application (Lotter, 2003). There were many other advances in IA in the nineteenth and twentieth centuries: agricultural mechanization, Mendelian genetics, the development of synthetic pesticides, and the Green Revolution (Hurt, 2002; Smil, 2000). Agricultural production increased by sevenfold between 1880 and 1980 (Bawden, 1991). These advancements in agriculture were driven by industry, federal support, and the development of the LGUS (Hurt, 2002). By the end of the twentieth century, IA had become characterized by large, highly specialized, and integrated operations. These large operations required large amounts of capital to cover the increasing cost of off-farm inputs such as synthetic fertilizers, pesticides, equipment, and feed (Beus & Dunlap, 1990; Ikerd, 1993). IA also reduced labor requirements by mechanizing as much as possible. As Drache (as cited in Beus & Dunlap, 1990) described it, "Modern farming, like any other business, is a matter of mechanization, money, and management" (p. 604).

The Development of an Alternative Agricultural Paradigm

The pioneers of OA were critical of the industrialization and specialization of agriculture (Stinner, 2007). OA did not reject science or agricultural research but

disputed its reductionism. Howard, the father of OA, did not dispute Sprengel and Liebig's theories but contended the emphasis on soil chemistry and the Law of the Minimum was to the detriment of soil biology and structure (Heckman, 2005). Instead, Howard proposed the Law of Return, which advocates for a balance of the cycles of life and death in a farming system using nature as a model. In natural ecosystems the cycles of growth and decay develop a balance. A plant grows, utilizing nutrients from decaying plant and animal matter made available by microorganisms (Stinner, 2007). Howard argued the disruption of this cycle leads to depleted levels of humus and organic matter, which increases soil erosion, reduces soil water holding capacity, increases disease and insect problems, and weakens plants. Howard promoted techniques to increase humus levels in the soil by recycling organic farm and human waste products and fostering soil biological life.

OA is a holistic farming system that is site specific and works with nature rather than against it. OA substitutes management and labor for capital and inputs. Howard modeled OA after natural processes observed in nature. He defined the primary characteristics of OA as follows:

- integration of crops and livestock;
- diversity of crops;
- soil preservation;
- humus production through recycling plant and animal waste;
- no waste from production;
- balance between growth and decay;

- a consistent reservoir of fertility present in soil;
- attention to water holding capacity and soil water retention; and
- plants and animals naturally defending themselves against diseases (Heckman, 2005).

Howard purported that by increasing soil health, plant and human health were improved. Rodale, founder of the Soil and Health Foundation in the United States, summarized this principle as "healthy soils, equal healthy food, equals healthy people" (Kristiansen & Merfield, 2006, p. 5).

Organic agriculturists also denounced the reductionist science taking place in universities and experiment stations, arguing a more holistic view of science and research was needed. One of the core principles of OA is its holistic approach to farming. The farm was viewed as one whole system, and as such "the whole farm [is] the starting point and basic unit of agricultural research" (Vogt, 2007, p. 24). The first study to conduct a research experiment this way was the Haughley experiment, a farm-scale size research project established by Balfour in 1939 (Stinner, 2007). The experiment evaluated three different farming systems on 85 hectares over a period of almost 30 years. Milton, the bio-chemist who conducted all the soil analysis for the experiment, concluded that "the Haughley Experiment has shown how wasteful of natural resources is modern commercial farming" (as cited in Stinner, 2007, p. 50).

OA did not gain much ground in the first half of the twentieth century and was almost lost in obscurity. It was revitalized as it became linked with an emerging environmental paradigm, and the conflict between this new paradigm and the DSP.

The Growing Paradigmatic Debate

The conflict between the two opposing paradigms took many forms, including a battle of words. The prominent authors advocating OA released numerous books and articles attacking IA, and their language reflected the intense conflict between the two paradigms. Howard published *War in the Soil* in 1946 in England, which Rodale later published in the United States. Rodale also wrote and published *The Organic Front* in 1948, in which he advocated that organic farmers "become activists against bad governmental policies and giant vegetable factories" (Sligh & Cierpka, 2007, p. 33). Faulkner criticized the extensive use of the moldboard plow in *The Plowman's Folly,* and promoted techniques to conserve soil organic matter. Faulkner, along with Aldo Leopold, Louis Bromfield, and others, started the Friends of the Land group and started publishing *The Land,* a journal promoting more sustainable agricultural practices (Vogt, 2007; Sligh & Cierpka, 2007). As Guthman (1998) put it, "championed by a handful of 'visionaries' and 'cranks,' organic farming eventually developed into a whole set of alternative production practices that explicitly countered trends in the industrialization of agriculture, but was regarded by most as quackery" (p. 136).

Initially, adherents to the DSP merely disregarded the advocates of OA and dismissed them as foolish farmers with little understanding of real agricultural production (Beus & Dunlap, 1990). The LGUS ignored OA as well, and perceived many of OA's proponents to be a cult of kooks and "gloomy prophet[s]" (Heckman, 2005, p. 146). Organic farmers were seen as laggards reluctant to adopt new agricultural innovations (Rogers, 2003).

The conflict between OA and IA escalated in the last half of the twentieth century as they became part of a larger paradigmatic debate emerging in society. In the 1950s the technological worldview, which was and still is the DSP in 2011, began touting the accomplishments of science and technology. It seemed science could solve any world problems and technology would revolutionize people's lifestyles (Heckman, 2005). While IA followed this DSP, OA was incorporated into a growing alternative paradigm which was skeptical of these technological advances and scrutinized the consequences of these innovations.

While environmental organizations had been in existence since the end of the nineteenth century, their concerns leapt to the forefront of social issues in the 1960s (Cotgrove, 1982). The publication of Carson's *Silent Spring* in 1962 exposed the negative effect DDT and other organochlorines being used in industrial agricultural production had on ecosystems (Heckman, 2005). This created a growing concern over industrial agricultural practices, which made OA a natural ally. OA shared many of the same core values and beliefs as the emerging alternative environmental paradigm as demonstrated by Table 1 developed by Cotgrove (1982). They both esteemed nature, viewing it as a benevolent and delicate resource to be conserved, while industrialists viewed nature as a plentiful resource to be dominated. The environmentalists and organic agriculturists also rejected the materialism of the industrial paradigm, and placed more value on self-actualization than on wealth.

Table 1

Counter Paradigms

	Dominant Paradigm	Alternative Environmental Paradigm
Core Values	Material (economic growth)	Non-material (self-actualization)
	Natural environment valued as resource	Natural environment intrinsically valued
	Domination over nature	Harmony with nature
Economy	Market forces	Public interest
	Risk and reward	Safety
	Rewards for achievement	Incomes related to need
	Differentials	*Egalitarian
	Individual self-help	Collective/social provision
Polity	Authoritative structures: (experts influential)	Participative structures: (citizen/worker involvement)
	Hierarchical	*Non-hierarchical
	Law and order	*Liberation
Society	Centralized	Decentralized
	Large-scale	Small-scale
	Associational	Communal
	Ordered	*Flexible

Table 1 Cont.

	Dominant Paradigm	Alternative Environmental Paradigm
Nature	Ample reserves	Earth's resources limited
	Nature hostile/neutral	Nature benign
	Environment controllable	Nature delicately balanced
Knowledge	Confidence in science and technology	Limits to science
	Rationality of means	Rationality of ends
	Separation of fact/value, thought/feeling	Integration of fact/value, thought/feeling

* Some environmentalists want a return to small-scale communities because they provide a traditional organic order – differentiated, hierarchical, and stable.
Note. From *Catastrophe or Cornucopia: The Environment, Politics and the Future* (p. 27), by S. Cotgrove, 1982, Chichester, England: John Wiley & Sons. Copyright 1982 by Stephen Cotgrove. Reprinted with permission.

One of the other prominent differences between the two paradigms was their opposing views on knowledge. The industrial paradigm placed great confidence in science and technology, believing they could solve any problem. The industrial paradigm also drew a distinction between thought and feeling. The alternative environmental paradigm did not separate thought and feelings, and viewed scientific and technological accomplishments with skepticism, feeling the means must justify the ends.

The stark difference between these two opposing views was stunningly demonstrated in a debate that took place in 1977 between Wendell Berry, a professor and author of *The Unsettling of America*, and Earl Butz, the former Secretary of Agriculture for the Nixon and Ford administrations. The two men met at Manchester College in North Manchester, Indiana, to debate the crisis confronting agriculture (Brand, 1986). Butz's statements focused on quantitative variables such as efficiency and production. Berry argued from a qualitative stance, mourning the loss of agrarian values and the farming lifestyle. The two stances they presented in that debate were so diametrically opposed that as Butz stated "I've got a feeling that Dr. Berry and I haven't met here tonight" (Brand, 1986, p. 124). Berry echoed this sentiment in his remark, "we may never meet because he's arguing from quantities and I'm arguing from values" (Brand, 1986, p. 126).

These two paradigms differ not only on agricultural practices, but agricultural principles and values, and constitute two opposing worldviews. The conflict between these two paradigms has impacted the development of these two agricultural production systems, with OA failing to receive support from the federal government and LGUS. An increasing interest in OA, though, has begun to change the level of support for OA.

Increasing Interest in Organic Agriculture

OA experienced immense growth throughout the rest of the twentieth century. A niche market for organic products had come about with most items being sold through health food stores and food cooperatives. The growing interest and demand was most prominently visible in California. California Certified Organic Farmers (CCOF) became

the first private organic certifying organization in the United States in 1973 and established standards to foster consumer confidence (Guthman, 1998). Other private organizations began establishing standards and certifying farms, which led to a proliferation of certifying organizations and a multitude of standards. By 1997, there were 12 state organic programs and agencies, and 40 organic certifying organizations, with no single consistent set of standards. In 1990, the National Food Protection Act was passed, and it included a mandate to create the National Organic Program (NOP) under the Agricultural Marketing Service agency. The NOP was to "establish (1) national standards for production and marketing of [organic products]; (2) a list of synthetic substances approved for use in [OA], (the National List of Allowed Materials); (3) an organic certification program; and (4) [organic product] import guidelines" (Lotter, 2003, p. 77). The establishment of a national set of standards and one nationally recognized certification label increased consumer confidence and allowed for the development of a rapidly growing market for organic products.

By the beginning of the twenty-first century OA had established itself as the fastest growing segment of agriculture. It has increased by 15 – 20% annually for the past decade, and is now a $21.1 billion agricultural market (Dimitri & Oberholtzer, 2009). The amount of agricultural land being converted to organic agricultural production has been increasing as well, from 1.3 million acres in 1997 to just over 4 million in 2005, most of this increase being pastureland (Dimitri & Oberholtzer, 2009). While the amount of organic agricultural land more than doubled between 1997 and 2005, it has not been enough to keep up with demand. The U.S. currently exports

between $125 million and $250 million of organic agricultural products, but imports $1.5 billion (Constance & Choi, 2010). As Dimitri and Oberholtzer (2009) noted, “despite the growing demand for organic food products, many U.S. farmers are reluctant to switch to organic production methods” (p. 11).

Institutional Support as a Barrier to Adoption of Organic Agriculture

One of the primary barriers to the adoption of OA has been a lack of institutional support. Unlike countries in the European Union (EU), the decision to adopt OA in the United States has not been advocated or supported by federal or state agencies (Bloom & Duram, 2007; Constance & Choi, 2010; Duram, 2000; Padel, 2001; Padel & Lampkin, 2007). Many governments in the EU provided subsidies or payments to increase adoption of OA and financially assist farmers through the transition period. As farmers work to rebuild the soil's biological activity, its nutrient reservoir, and its physical structure, there is a transition period lasting about 5 years (Dimitri & Oberholtzer, 2009; Raviv, 2010). During this transition period yields are greatly reduced, but once the soil biology and physical structure have improved, so do the yields. The farmer’s information needs are extremely high during this period as they must relearn how to farm. As Morgan and Murdoch (2000) explain, "instead of the cumulative growth of knowledge which typifies most conventional innovations, the organic conversion process requires innovators to forget much of the knowledge they have acquired in intensive production" (p. 167).

The traditional information sources for farmers in the United States, though, have not promoted or supported the adoption of OA. State extension service agencies are to serve as the link between the LGUS and farmers, both delivering current research-based information to farmers, and taking farmers' needs and transmitting them back to research faculty (Gardner, 1990). This link has failed to work for many organic farmers in the United States. In OFRF's survey of organic farmers in 1999, the lowest rated personal sources for information on OA were USDA offices, state departments of agriculture, and state extension service agencies, while the lowest rated media sources were television and radio (Walz, 1999). In Walker's (2009) interviews with organic farmers in Texas, one of them described their experiences with the Texas extension service:

> "When I went to the extension service for information and advice in the early eighties," Dennis remembers, "as soon as the word 'organic' came out of my mouth, I was looking at the door. They told me they didn't have anything." (p. 18)

The analogy of a door has been used by others to refer to the relationship between extension and organic farmers. This researcher received a comment from an organic farmer who had been contacting Texas extension specialists requesting their participation in the Texas Organic Farmers and Gardeners Association's (TOFGA) annual conference. He described his transactions with the specialists by asking the researcher "have you ever felt like you've had the door slammed in your face over the phone?" (M. Chapin, personal communication, December 9, 2009). DeWitt also used a door in an analogy, but to urge "Extension Service across the country to reach out and

try to work with these groups [SA farmers], get in the door and use them as multipliers, not shut the door on them" (as cited in Agunga, 1995, p. 180).

The lack of information from traditional communication channels led organic farmers to develop alternative information systems consisting of other organic farmers, farmer based organizations, and certifying agents (Bloom & Duram, 2007). These farmers and farmer networks were generating and sharing what Kloppenburg (1991) termed "local knowledge." Kloppenburg (1991) also noted this was the primary source of information for farmers before the creation of the USDA and LGUS, but in the twentieth century farmers were left out of the process of scientific research and knowledge production. The LGUS failed to acknowledge the credibility of farmer's local knowledge, and instead researched and disseminated information that was valid regardless of space or time.

The Role of Extension Agents in Alternative Agriculture

The extension service was established under the Smith-Lever Act of 1914, with the task of extending agricultural research and innovations from the LGUS to farmers, and to transmit the needs of farmers back to the LGUS (Gardner, 1990). The dominant model guiding the extension service for the last half of the twentieth century has been the diffusion of innovation theory. Rural sociologists at LGUS focused their efforts on studying characteristics of the innovation adoption process, which aided extension in transferring new agricultural technologies to farmers in their counties (Buttel, 1985). By

this model organic farmers were seen as laggards reluctant to adopt new innovations and not as innovators to be encouraged (Rogers, 2003).

Studies on CEA's knowledge and perceptions of alternative agricultural systems have supported the claim that the lack of institutional support serves as one of the primary barriers to adoption. Agunga (1995) reported CEA in Ohio to be apathetic towards SA and that they felt "talking about sustainable agriculture would undermine their credibility" (p. 178). Paulson (1995) found CEA to be skeptical of the viability of alternative agricultural practices advocated by alternative agricultural organizations. Jayaratne, Martin, and DeWitt (2001) reported the majority of extension educators in Iowa had a positive perception of SA, but did not believe it to be economically viable. Creamer, Baldwin, and Louws (2000) reported CEA's attitudes and perceptions of organic farmers as a barrier to extension involvement with organic growers. OFRF's survey of organic farmers found extension agencies, state departments of agriculture, and USDA offices to be the least useful sources for information on OA (Walz, 1999). Lohr and Park (2003) found the perception of extension as a barrier to OA to vary regionally with organic farmers in the southern and north central U.S. more likely to rate extension as a barrier.

This negative attitude was not restricted to just the extension service but extended throughout the LGUS and government agencies. There are CEA willing and interested in providing information on these systems, but the limited amount of research restricts their capacity to provide this information. As Creamer, Baldwin and Louws (2000) explained, "the extension community answers that the primary reasons for any

perceived unresponsiveness to demands for information relating to organic production practices and enterprises are a lack of both adequate training and available research-based, resource materials" (p. 676). Lipson (1997) found that in 1995 only 0.1% of research projects funded by the USDA focused on organic agricultural production or methods used in OA. Lotter (2003) noted that faculty conducting research on alternative agricultural systems encountered significant barriers and personal risks. The federal government drastically increased funding for organic research with the 2008 Farm Act, allotting $78 million for organic research and extension, five times the amount appointed in the 2002 farm bill (Constance & Choi, 2010). While OA research from LGUS is still in its infancy, it is growing and will need to be disseminated to organic farmers through state's extension services.

Lotter (2003) observed that this trend had begun to shift with the negative attitudes starting to subside. This could possibly be attributed to younger personnel and faculty being more open to alternative agriculture. Sisk's (1995) survey of CEA in the southern region of the United States found a statistically significant difference in attitude toward SA based on CEA's age group, with younger CEA more likely to support SA concepts.

CEA training is needed to prepare CEA to provide information on alternative agriculture as alternative agricultural systems require CEA to learn a new way of thinking and teaching. Jayaratne, Martin, and DeWitt (2001) argued that CEA training on alternative agriculture should not only teach subject matter but also focus on educational delivery as it is not merely diffusion of an innovation but an educational

process. Creamer, Baldwin, and Louws (2000) explained, "by its very nature, organic production, one type of sustainable system, requires an interdisciplinary and systems approach to research and training" (p. 676). Connor and Kolodinsky (1997) provided three other recommendations for CEA training in SA: (a) reevaluate the convention of universal trainings that do not account for differences in individuals' attitudes and knowledge levels, (b) utilize CEA with extensive experience and knowledge in SA as mentors for beginning CEA, and (c) the trainers need to decide if the purpose of the training is to strictly provide information on SA or is it to advocate and promote SA. If the training is to advocate SA or any other alternative agricultural production system, the training will need to assess CEA's attitudes and perceptions and their potential as a barrier to CEA's readiness to learn.

Attitude as a Predictor of Behavior

Social psychology has tried to explain the development of attitudes and their influence on behavior. Individuals' attitudes are amalgamations of their beliefs about a specific object or person. A belief is the establishment of a link between an object and a characteristic or feature (Fishbein & Ajzen, 1975). An example would be dogs (object) bark (trait), or a dissertation (object) is hard to write (trait). The combination of all the beliefs an individual has about a certain object form their attitude toward that object (Ajzen & Fishbein, 1975). This attitude then predisposes them to act a certain way toward that object. While this may explain an individual's predisposition to a certain behavior, it is an individual's attitude toward that specific action that determines their

behavior. Ajzen and Fishbein (1980) delineated the theory of reasoned action which theorized that, assuming humans are acting rationally and on their own free will, they will decide to perform or not perform an action based on the information available to them and the perceived consequences of their actions. Ajzen and Fishbein (1980) found this theory to function on two major factors influencing an individual's behavior: behavioral beliefs and normative beliefs (Figure 2). Behavioral beliefs are rooted in the individual's perceived implications of that action, their perception of and attitude toward the prospective behavior, and the perceived consequences of that action. Normative beliefs are related to perceived social implications of the action, the influence of peers and other opinions they may esteem. While Ajzen and Fishbein (1980) theorize that the factors of behavioral and normative beliefs always hold true, they also acknowledge there are many other factors that influence behavior. Factors such as demographics, attitudes toward people and institutions, and personality traits may also influence behavior, but not in a stable enough pattern to be incorporated into the theory. One limitation to reasoned action, though, is the assumption of rational behavior. Sapp (2002) found a lack of knowledge, or incorrect knowledge, can cause nonrational behavior. Thus, if an individual has a lack of knowledge or incorrect knowledge, they may not act rationally and their attitude will not be an accurate predictor of behavior.

Sustainable Agriculture versus Organic Agriculture

In TAES' (2009) current strategic plan, the first priority listed is to "ensure a sustainable, profitable, and competitive food and fiber system in Texas" (Executive

summary, p. i). There has been much debate regarding the form of this sustainable agricultural system and organic agriculture's location in that picture. Some have argued organic is a subset of sustainable, while Rodale commented that "sustainable was just a polite word for organic farming" (as quoted in Rigby & Caceres, 2001, p. 26). Wu and Sardo (2010) contend, though, that:

> Since the concept of sustainability is fundamentally dynamic, site- and time-specific, proposed solutions are expected to be flexible, custom-tailored for the single farms and open to technological and scientific progress, avoiding any pre-concocted paradigm and dogmatism; as a consequence, it is evidenced that some rigid principles typical of organic farming are not compatible with sustainable agriculture. (p. 42)

Pretty (1995) rejects the attempts to define SA completely, as he argues it is "not so much a specific farming strategy as it is an approach to learning about the world" (p. 1250). Most of the studies on CEA knowledge and attitude toward alternative agriculture have focused on the concept of SA, but the divergence of opinions on its definition, principles and practices has presented many challenges. This disparity of opinion on the definition of SA leaves many CEA uncertain of its meaning (Agunga, 1995; Conner & Kolodinsky, 1997; Jayartne, Martin & DeWitt, 2001).

Lipson (1997) contends the origins of SA are rooted in the resistance to OA. In the 1980's proponents of OA had pressed the USDA to set aside research funding for OA but with no success. In order to avoid some of the hostility associated with the "o-word"

advocates for agricultural reform selected other terms more palatable with SA receiving the most support, but in the process lost some of the principles of OA (Lipson, 1997).

Organic agriculture has distinguished itself from many of the other alternative agricultural practices through its distinct definition and strict regulation. The Soil Association in England established OA standards in 1967, which defined "recommended, restricted and forbidden substances and practices" (Schmid, 2007, p. 154). The first certification program in the United States was established by Rodale with the Rodale Seal of Approval, and these standards were adopted by the California Certified Organic Farmers (CCOF) in 1973 (Guthman, 1998).

As interest began to grow in OA and confusion over what it actually was, there became a need to clarify the concept. The first collaborative effort to establish a precise definition of OA with consistent standards was with the founding of the International Federation of Organic Agriculture Movements (IFOAM) in 1972. IFOAM was initially a collaborative effort between five primary organizations: the Soil Association from both England and South Africa, the Swedish Biodynamic Association, Rodale Press from the US, and Nature et Progres from France (Geier, 2007). It released its first set of official standards in 1982. In 2005 it released its latest definition for OA:

> Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the

> shared environment and promote fair relationships and a good quality of life for all involved. (IFOAM, 2009, section Definition of Organic Agriculture, para. 1)

The USDA also developed its own definition and principles for OA as mandated in the 1990 National Food Protection Act. The USDA established the NOP to accomplish this task and after 12 years the federal standards for organic agriculture were released, defining OA as:

> A system that is managed in accordance with the Organic Foods Production Act (OFPA) of 1990 (PDF) and regulations in Title 7, Part 205 of the Code of Federal Regulations to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.

As Rigby and Caceres (2001) noted, organic agricultural practices are "unique, for they are the only ones codified as law" (p. 25). This regulation and organic certification allows for certified products to receive a premium, increasing the profitability of growing certified organic products. Raviv (2010) compared 27 different horticultural crops and found that without any price premiums many vegetables grown in rotations on organic farms were not as profitable as conventional vegetables. However, when the price premiums were applied, organic products were more profitable for all of the 27 different crops. Chavas, Posner, and Hedtke (2009) also found the same result in their trial. Before organic price premiums were applied, the profitability of the organic plots were the below or the same as their conventional counterparts. After the price premiums were applied, though, all organic plots were more profitable than the conventional plots,

with some returns increasing by as much as 85-110%. Oberholtzer, Dimitri and Greene (2005) compared organic price premiums for broccoli, carrots, and mesculin mixes, and reported premiums of 99-153%, 75-162%, and 6-9% respectively.

While OA commodities receive a price premium, many critics reject OA with the argument that it is inefficient and its level of production could not sustain the world's population. Former Secretary of Agriculture Earl Butz even went so far as to say "when you hear the word organic, think starvation" (as cited in Lipson, 1997, p. 17). Numerous studies have tried to compare the yields of conventional and OA. Chavas, Posner and Hedtke (2009) reported the results of a trial comparing six different systems over a 13 year period. They found organic systems have the potential to be as productive as conventional systems, but experienced larger variability in organic system yields due to weed control issues in wet springs. Mondelaers et al. (2009) conducted a meta-analysis of comparison studies and found OA to be 81-83% as productive as IA. Badgley et al. (2007) found an even smaller disparity between conventional and OA, reporting OA to be 92% as productive. In models in developing countries, Badgley et al. (2007) actually found OA to be even more efficient than IA and concluded "model estimates indicate that organic methods could produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base" (p. 86). Stanhill (1990) reviewed 205 yield comparisons from numerous studies and found almost one third reporting higher yields in the organic agricultural production systems. Stanhill noted higher yields were more common in livestock comparisons, especially in regards to milk. As Raviv (2010)

concluded, “it is too early to conclude which of these two contrasting positions is more accurate” (p. 317). Lotter (2003) contended “going head-to-head in yield comparisons may be unfair until research and extension investment into [OA] catches up and allows [OA] to reach a mature stage comparable to [IA] systems” (p. 72). In 1995 0.1% of the USDA’s research funding was directly related to OA (Lipson, 1997). Most of the progress and developments in OA have had to take place outside the traditional systems, relying on farmers and farmer-based organizations for research and education (Michelsen, 2001; Padel, 2001).

As the market for organic products continues to increase, interest and demand for information on OA will as well. Certified organic products gain a premium which is attracting many conventional farmers, but a lack of institutional support has prevented the adoption of OA. The animosity between two conflicting paradigms in agriculture has advanced IA but prevented the expansion of alternative agricultural productions systems. OA is the only agricultural production system with a federally regulated definition and certification program that creates a market premium for the product. There have been studies on CEA’s perceptions and attitudes towards alternative agricultural production systems, but few have been conducted on CEA’s perceptions of OA. CEA’s attitudes toward and perceptions of OA need to be assessed in order to increase institutional support for OA. Figure 3 depicts the theoretical framework for this study.

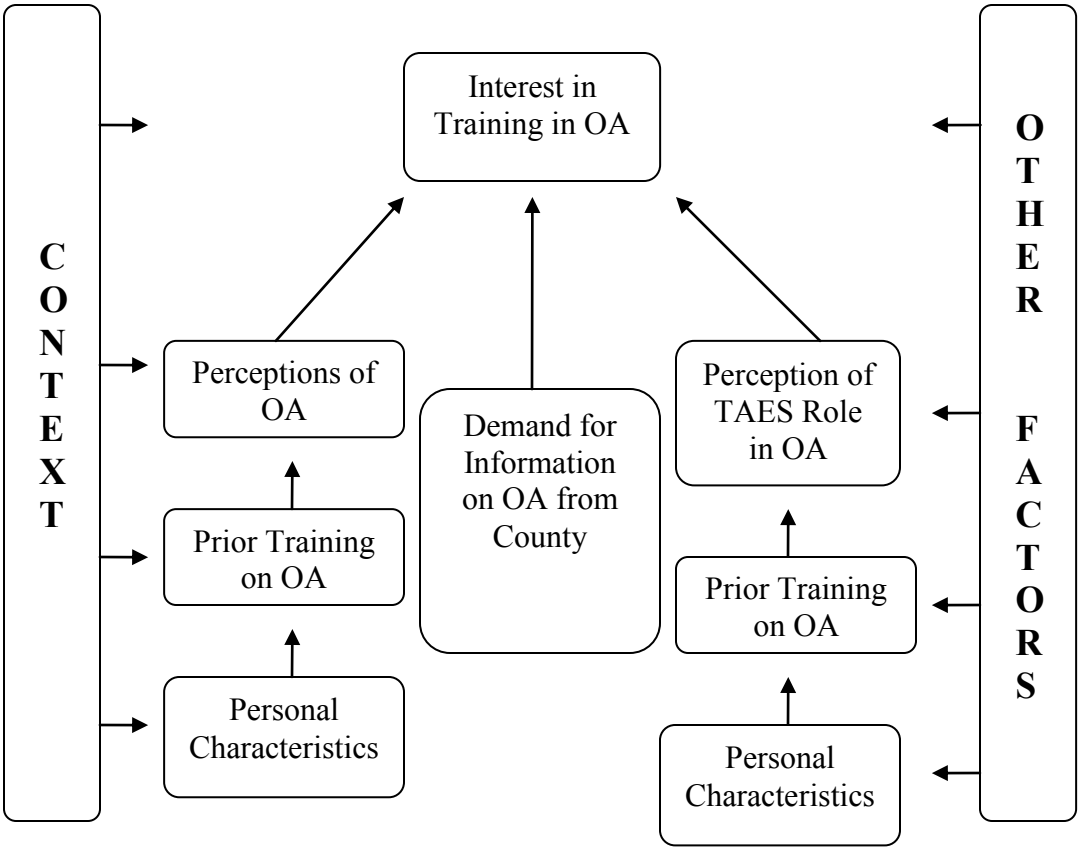

Figure 3. Conceptual Framework for Factors Influencing CEA's Interest in Training in OA.

CHAPTER III

METHODOLOGY

This research methodology follows the post-positivist tradition and realist ontological position. The positivist tradition holds that objective truths exist, but as described in the literature review, collective human knowledge forms paradigms which shift through history (Kuhn, 1977). Post-positivism still acknowledges objective truths exist, but that as humans we maintain conjectures, unproven theories which seem to be true (Popper, 1965).

This study utilized a one shot case study survey methodology (Campbell & Stanley, 1963). This methodological approach allowed for the exploration and generalization of CEA's perceived level of current interest in OA in their county, their perception of OA, and interest in training on OA. The primary threat to internal validity for this methodology was history, and was controlled for through consistency.

There are four primary program areas in TAES: agriculture and natural resource, family consumer science, 4-H and youth development, and community economic development (TAES, 2010). This study focused on CEA with primary responsibility in agriculture and natural resource programming, which included CEA in one of the following roles: Agriculture, Agriculture/Natural Resource, Horticulture, Integrated Pest Management, and Natural Resource. According to the October 2010 TAES Personnel Directory, there was a total of 285 CEA in one of those roles. Using Cochran's (1977) formula for calculating a sample size for continuous data, an initial sample size of 267

was calculated. As this was more than 5% of the sample population, Cochran's correction formula was used for a final sample size of 151. A list of randomly generated numbers was used to select a simple random sample of CEA from the personnel directory (Gall, Gall, & Borg, 2007).

Data was collected using an online questionnaire consisting of six sections: (a) level of demand for information on OA, (b) level of training CEA have received related to OA, (c) CEA level of involvement in providing information OA, (d) CEA's perception of OA, (e) CEA's perceptions of TAES' involvement in OA, and (e) CEA demographics (Appendix A).

The first section evaluated the level of demand for information on OA CEA are receiving. The first item asked CEA to rate the change in demand for information on OA over the past five years using the following choices: "no demand," "significantly decreased," "decreased," "stayed the same," "increased," "significantly increased," or "I don't know." The second item asked CEA to evaluate the current demand they are receiving for information on OA by selecting one of the following options: "no demand," "extremely low," "low," "moderate," "high," "extremely high." The last items in this section asked CEA to report how frequently they provide information on OA and the primary audiences for this information.

The next section evaluated CEA's level of training and their preferred forms of training and information on OA. This section examined the types of training CEA have had on OA and their level of confidence in providing information on OA. It was adapted from Sisk's (1995) questionnaire assessing CEA's competencies related to SA. This

section also included questions on CEA's preferred forms of training and information on OA at the request of TAES' Organic Working Group. CEA were provided a list of 10 topics and asked to rate their interest in participating in training on the topics. This section used a five-point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, 5 = *Strongly Agree*). The scale was interpreted using the following criteria: 1.00 – 1.50 = *Strongly disagree*, 1.51 – 2.50 = *Disagree*, 2.51 – 3.50 = *Neither disagree or agree*, 3.51 – 4.50 = *Agree*, 4.51 – 5.00 = *Strongly agree*. CEA were also provided a list of seven information delivery methods and asked to rank their usefulness using the following scale: "not at all useful," "not very useful," "somewhat useful," "very useful." A comment box was included to allow CEA to provide further suggestions.

The third section evaluated CEA's perceptions of OA. A construct developed by Sisk (1995) was modified to fit this instrument. Sisk assessed CEA's perceptions of SA with a 10 item construct and reported a Cronbach's alpha of 0.71. The items were modified and expanded to emphasize OA. CEA were asked to rate their level of agreement or disagreement to the 10 statements using a five-point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, and 5 = *Strongly Agree*). The scale was interpreted using the following criteria: 1.00 – 1.50 = *Strongly disagree*, 1.51 – 2.50 = *Disagree*, 2.51 – 3.50 = *Neither disagree or agree*, 3.51 – 4.50 = *Agree*, 4.51 – 5.00 = *Strongly agree*.

The fourth section evaluated CEA's perceptions of TAES' involvement in OA. CEA were asked to rate their level of agreement or disagreement to 8 statements using a

five-point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, 5 = *Strongly Agree*). This section was also adapted from the questionnaire developed by Sisk (1995), for a scale about which he reported a Cronbach alpha of 0.61. The scale was interpreted using the following criteria: 1.00 – 1.50 = *Strongly disagree*, 1.51 – 2.50 = *Disagree*, 2.51 – 3.50 = *Neither disagree or agree*, 3.51 – 4.50 = *Agree*, 4.51 – 5.00 = *Strongly agree*.

The last section collected CEA personal characteristics. CEA were requested to provide their age, gender, years employed by TAES, CEA role, if they were the primary agent responsible for information on OA in their county, and their county's population level. Ages were delineated into 5 categories: 20-30, 31-40, 41-50, 51-60, and over 60. Gender options consisted of male or female. CEA were requested to enter a numerical answer for the number of years employed by TAES. As previously stated, this study was limited to CEA in roles that focus primarily on agriculture/natural resource programming, which consists of five CEA roles: Agriculture, Agriculture/Natural Resource, Horticulture, Integrated Pest Management, and Natural Resource. CEA were requested to indicate which role they were in. An "other" selection was included in case a respondent from outside the sample frame completed the survey. Certain counties may contain numerous agents in various roles while other counties may have only one agent fulfilling all of the roles. A question was incorporated into the questionnaire to determine if the respondent was directly involved and responsible for programming on OA. The CEA was also requested to report if their county was primarily rural, suburban,

or urban. A comment/suggestion box was also included to provide CEA an opportunity to provide further information and feedback.

Content validity of the instrument was established by faculty at Texas A&M University, Virginia Tech University, Sam Houston State University, and Cornell University, and representatives from TAES, TDA, and USDA's Economic Research Service (ERS). Modifications were made to several statements and scales to increase clarity.

As this study included research with human subjects, a request for to conduct the research was submitted to Texas A&M University Institutional Review Board and was approved September 8, 2010. Modifications were made to the instrument and an amended request was submitted and approved October 1, 2010. After the pilot study more modifications were made to the instrument, and a final amended request was submitted with final approval received in October 26, 2010 (Appendix C).

A pilot study was conducted to evaluate reliability. Reliability was estimated by calculating a Cronbach's alpha (Cronbach, 1951). Members subscribing to one of the following four email listservs served as the sample frame for the pilot study: Sustainable Agriculture Network (SANET), Sustainable Agriculture Education Association (SAEA), and Community Food Security Coalition. Requests to participate in the pilot study were distributed through the listservs, and a total of 33 responses were received. Reliability estimates were calculated for the two constructs developed by Sisk, and Cronbach's alpha estimates of $r = 0.85$ and $r = 0.84$ were achieved.

The survey of TAES CEA began in early November 2010. TAES administration assisted in the delivery and implementation of the survey, greatly increasing the response rate for this study. The associate director for Agriculture, Natural Resources & Community Economic Development (ANR/CED) for TAES emailed the four Regional Program Directors (RPD) for Texas requesting them to support this research and encourage CEA in their respective regions to participate in this study. The RPD then emailed a request with the link to the online questionnaire to a list of randomly selected CEA in their region. The online questionnaire included a question on respondent email address to verify and track respondents. Two of the initial 151 randomly selected CEA had resigned in October, thus leaving a total sample size of 149. A second request for CEA participation was sent from the associate director and through the RPDs to nonrespondents. Data collection ended December 17, 2010, at 4:00 pm.

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, 16.0). An a priori alpha level was set at 0.05, with the primary variables of interest including: (a) level of demand, (b) level of involvement, (c) level of training, (d) level of interest in training, (e) perceptions of OA, (f) perceptions of TAES' involvement in OA, and (g) CEA personal characteristics.

Objective One

Frequencies and percentages were used to describe the personal characteristics of TAES CEA (age, gender, years employed by TAES, CEA position, and population density of county).

Objective Two

Frequencies and percentages were calculated to determine the perceived level of demand for information on OA CEA were receiving in their respective counties.

Objective Three

Frequencies and percentages were calculated to determine CEA's level of prior training related to OA, and their preferences for future resources and training.

Objective Four

Frequencies and percentages were calculated to describe CEA's perceptions of OA.

Objective Five

Frequencies and percentages were calculated to describe CEA's perceptions of TAES' involvement in OA.

Objective Six

Correlations were calculated to determine what significant relationships existed between CEA personal characteristics, interest in training, and perceptions of OA, and perceptions of TAES capabilities and role related to OA. Pearson's product-moment correlation coefficient was used to determine the degree of relationship, and strength of relationship described using Davis' (1971) interpretation:

Objective Seven

Multiple regression was used to analyze which variables predicted CEA's perceptions of OA.

Objective Eight

Multiple regression was used to analyze which variables predicted CEA's perception of TAES' capabilities and role in relation to OA.

Objective Nine

Multiple regression was used to analyze which variables predicted CEA's level of interest in training in OA.

Objective Ten

One-way analysis of variance tests were calculated to determine if any statistically significant differences existed between perceptions categorized by personal

characteristics. The magnitude of the effect was interpreted using Cohen's *d* (1988): *r* = .10 small effect, *r* = .30 medium effect, *r* = .50 large effect. Post hoc analyses were run on statistically significant differences to determine where the differences were.

CHAPTER IV

FINDINGS

This chapter presents the response rate and the results of the survey organized by research objective.

Response Rate

The research population for this study consisted of CEA employed by TAES in the Agriculture and Natural Resource program areas. These included five agent roles:

- Agriculture
- Agriculture/Natural Resource
- Horticulture
- Integrated Pest Management
- Natural Resource

According to the TAES October employee directory the target population contained 285 CEA. Random sampling was employed to generate a random sample of CEA ($N = 151$) (Gall, Gall, & Borg, 2007).

The initial survey request generated a response rate of 51.7% ($n = 78$). Two more requests were sent out, achieving a final response rate of 81.5% ($n = 123$). Four responses were not included in data analysis due to missing data, leaving a total of 119 responses for analysis.

Non-Response Error

Non-response error was examined by one of the methods reported by Lindner, Murphy, and Briers (2001). Early and late respondents were compared using independent samples *t*-tests to determine if there was a statistically significant difference between the two groups. Respondents were categorized by response time with the first 50% of respondents classified as early respondents (n = 60) and the last 50% of respondents classified as late respondents (n = 59). Independent *t*-tests were calculated to determine if there was a significant difference between early and late respondents on scaled items and demographics.

Results of these analyses indicated there were no statistically significant differences between early and late respondents on (a) perceived change in interest in OA, $t(119) = -.144$, Table 2; (b) perceived current level of interest in OA, $t(119) = .460$, Table 3; (c) interest in training on OA, $t(119) = -.703$, Table 4; (d) perception of OA, $t(119) = -.812$, Table 5; (e) perception of TAES involvement in OA, $t(119) = .284$, Table 5; (f) age, $t(119) = -.410$, Table 6; (g) years employed by TAES, $t(119) = .653$, Table 7; or (h) population density of county, $t(119) = .581$, Table 8 (all p values >.05). No statistical tests could be run comparing early and late respondents on type of CEA position due to low cell size.

Table 2

Comparison of Early and Late Respondents on Change in Level of Interest

Response	SI	I	SS	D	SD	DK	*t*	*p*
	f	*f*	*f*	*f*	*f*	*f*		
Early[a]	10	24	18	2	0	3	-.144	.104
Late[b]	4	22	19	3	1	9		

Note. $N = 119$. DK = don't know; SI = significantly increased; I = increased; SS = stayed the same; D = decreased; SD = significantly decreased.
[a] $n = 60$. [b] $n = 59$.

Table 3

Comparison of Early and Late Respondents on Current Level of Interest in Organic Agriculture in Their County

Response	EH	H	M	L	EL	ND	*t*	*p*
	f	*f*	*f*	*f*	*f*	*f*		
Early[a]	1	8	21	18	9	3	.460	.647
Late[b]	2	4	21	21	6	5		

Note. $N = 119$.EH = extremely high, H = high, M = moderate, L = low, EL = extremely low, ND = no demand.
[a] $n = 60$. [b] $n = 59$.

Table 4

Comparison of Early and Late Respondents on Interest in Training on Organic Agriculture

Response	*n*	*M*	*SD*	*t*	*p*
Early	60	3.52	.724	-.703	.465
Late	59	3.62	.842	-.702	

Note. Scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, 5 = Strongly agree.

Table 5

Comparison of Early and Late Respondents by Variables of Interest

Response	*n*	*M*	*SD*	*t*	*p*
Perception of OA					
Early	60	2.60	.593	-.812	.843
Late	59	2.69	.659		
Perception of TAES' Involvement in OA					
Early	60	3.40	.679	.284	.337
Late	59	3.36	.580		

Note. N=119. SD = strongly disagree; D = disagree; NDA = neither disagree nor agree; A = agree; SA = strongly agree.

Table 6

Comparison of Early and Late Respondents by Age

Response	21-30	31-40	41-50	>50	*t*	*p*
	f	*f*	*f*	*f*		
Early[a]	11	13	27	9	-.410	.158
Late[b]	12	13	18	16		

Note. N=119. [a]n = 60. [b]n = 59.

Table 7

Comparison of Early and Late Respondents by Years Employed by TAES

Response	<5	5-10	11-20	>20	*t*	*p*
	f	*f*	*f*	*f*		
Early[a]	14	14	21	11	.653	.721
Late[b]	17	14	18	10		

Note. N=119. [a]n = 60. [b]n = 59.

Table 8

Comparison of Early and Late Respondents by Population Density of County

Response	Urban	Suburban	Rural	*p*
	f	*f*	*f*	
Early[a]	6	8	46	.272
Late[b]	8	8	43	

Note. N=119. [a]n = 60. [b]n = 59.

Based on the high response rate and lack of statistically significant differences between early and late respondents, it was concluded that these data could be generalized to the target population. However, caution should be taken in generalizing results on CEA positions to other populations due to low cell size.

Objective One: Findings

The first objective was to describe the personal characteristics of TAES CEA (age, gender, years employed by TAES, CEA position, and population density of county).

Age

Table 9 provides the age distribution of respondents (N = 119). While respondents were fairly evenly distributed across most age groups, the largest percentage were in the 41-50 age group (n = 45).

Table 9

Respondent Age

Age	*f*	%
<= 30	23	19.3
31-40	26	21.8
41-50	45	37.8
>= 51	25	21.0
Total	119	100.0

Gender

Table 10 provides the distribution of respondents by gender (N = 119). Over 85% (n = 102) of respondents were male and less than 15% (n = 17) were female.

Table 10

Respondent Gender

Gender	*f*	%
Female	17	14.3
Male	102	85.7
Total	119	100.0

Years Employed by TAES

Table 11 provides the frequencies and percentages of respondents by years employed by TAES. A plurality of respondents reported they had been employed by TAES for 11 to 20 years (n = 39). Over 25% of respondents indicated they had worked for TAES for less than 5 years (n = 31).

Table 11

Years Employed by TAES

Years	*n*	%
<5	31	26.1
5-10	28	23.5
11-20	39	32.8
>20	21	17.6
Total	119	100.0

Extension Agent Position

Table 12 provides the distribution of respondents by extension agent position in TAES (N = 119). An overwhelming majority of respondents were agriculture and natural resource agents (n = 84). Agriculture agents (n = 13), horticulture agents (n = 11), and integrated pest management agents (n = 9) were about 10% of respondents, while less than 2% (n = 2) of respondents were natural resource agents. An “other” choice was provided in case any respondents in other CEA positions mistakenly

completed the questionnaire, but none were reported. These results are fairly representative of the target population, with HORT, IPM, and NR having less than 30 CEA. Due to the low cell size no statistical tests were run analyzing differences between extension agent positions and primary variables of interest.

Table 12

Respondents by Primary Agent Role

Role	*f*	%
Agriculture & Natural Resources (ANR)	84	70.6
Agriculture (AG)	13	10.9
Horticulture (HORT)	11	9.2
Integrated Pest Management (IPM)	9	7.6
Natural Resources (NR)	2	1.7
Other	0	0
Total	119	100.0

Responsibility for Information on Organic Agriculture

As some counties contain multiple CEA, respondents were asked if they were the primary agent responsible for information on OA in their county. The results of this question are in Table 13. Almost 87% of respondents indicated they were the primary agent responsible for information on OA in their county (n = 103), while 13% reported

they were not (n = 16). When cross tabulated with extension agent position, 37.5% of those responding they were not responsible for that information were agriculture and natural resource agents (n = 6), and another 32% were IPM agents (n = 5).

Table 13

Primary Agent Responsible for Information on Organic Agriculture in their County

Response	*f*	%
Yes	103	86.6
No	16	13.4
Total	119	100.0

Independent *t*-tests were run to determine if there were any significant differences on the primary variables of interest by responsibility for information on OA. No statistically significant differences were found, so all respondents were included in subsequent analyses. Due to the low cell size in CEA positions, a cross-tabulation was run to see if there were any visible differences (Table 14). Over 80% of AG, AG/NR, and HORT CEA reported they were the primary agent responsible for information on OA, but IPM and NR CEA were drastically different. Over half of IPM CEA (n = 5) and both of the NR CEA (n = 2) reported they were not responsible for information on OA.

Table 14

Primary Agent Responsible for Information on Organic Agriculture in their County

	Yes		No		Total	
CEA Position	*f*	%	*f*	%	*f*	%
AG	12	92.3	1	7.7	13	100.0
AG/NR	78	92.9	6	7.1	84	100.0
HORT	9	81.8	2	18.2	11	100.0
IPM	4	44.4	5	55.6	9	100.0
NR	0	0	2	100.0	2	100.0
Total	103	86.6	16	13.4	119	100.0

Population Density

Table 15 provides the distribution of respondents by population density of their respective counties (N = 119). Respondents in rural counties accounted for almost 75%, suburban 13.4%, and respondents in urban counties accounting for 11.8%.

Table 15

Population Density of Respondents' Respective Counties

Response	*f*	%
Rural	89	74.8
Suburban	16	13.4
Urban	14	11.8
Total	119	100.0

Objective Two: Findings

The second objective was to describe respondents' perceived level of demand for information on OA in their respective counties. Table 16 reveals that over 50% of respondents reported that the demand for information on OA was increasing and 5% reported it to be decreasing.

Table 16

Perceived Change in Interest in Organic Agriculture

Change in level of interest over past 5 years	*f*	%
Significantly increased	14	11.8
Increased	46	38.7
Stayed the same	37	31.1
Decreased	5	4.2
Significantly decreased	1	0.8
No interest	4	3.4
I don't know	12	10.1
Total	119	100.0

Table 17 shows that most respondents perceived the current level of demand for information on OA in their counties to be moderate (35.3%) or low (32.8%). Only 2.5% (n = 3) perceived demand to be extremely high while 12.5% (n = 15) perceived demand to be extremely low. About 7% (n = 8) of respondents perceived there to be no demand for information on OA in their respective counties.

Table 17

Perceived Current Level of Interest

Level of interest	*f*	%
Extremely high	3	2.5
High	12	10.1
Moderate	42	35.3
Low	39	32.8
Extremely low	15	12.6
No demand	8	6.7
Total	119	100.0

Respondents were asked how frequently they provided information on OA. Table 18 shows that 42% of CEA reported to provide information on OA less than once a month, and 33.6% provided information on OA one to two times a month. Almost 11% reported that they never provided information on OA, and only one respondent reported to provide information on OA on a daily basis.

Table 18

Frequency of Providing Information on Organic Agriculture

Frequency	*f*	%
Very often – daily	1	0.8
Commonly - at least once a week	15	12.6
Occasionally – 1-2 a month	40	33.6
Rarely - less than once a month	50	42.0
Never	13	10.9
Total	119	100.0

Respondents who reported that they provided information on OA were asked who their primary audience or audiences for this information were. Table 19 lists the audiences in order of frequency with gardeners being the most frequently cited audience (n = 74). More than 50% of respondents reported homeowners to be another primary audience. Less than 13% noted consumers (n = 15) and full-time ranchers/farmers (n = 15) to be their primary audiences for information on OA.

Table 19

Primary Audience for Information on Organic Agriculture

Audience	*f*	%
Gardeners	74	62.2
Homeowners	65	54.6
Part-time farmers/ranchers	35	29.4
Not applicable	18	15.1
Consumers	15	12.6
Full-time farmers/ranchers	15	12.6
Other extension agents	3	2.5

Objective Three: Findings

The third objective was to determine CEA's level of prior training related to OA, and their preferences for future resources and training. Table 20 shows that over 20% of respondents reported they did not have any training or experience related to OA. The most cited source of training was self-directed learning (n = 69) followed by on-the-job/in-service training (n = 41) and personal experience (n = 35). The least cited sources of training were university courses (n = 8) and industry workshops (n = 4).

Table 20

Experience and Training Related to Organic Agriculture

Source	*f*	%
Self-directed learning	69	58.0
On-the-job/in-service training	41	34.5
Personal experience	35	29.4
None	26	21.8
Working with producers using organic agricultural practices	17	14.3
Professional conference	16	13.4
University/college workshop	9	7.4
University/college course	8	6.7
Industry workshop	4	3.4
Other	3	2.5

Respondents indicated their level of confidence in providing information on OA, which is shown in Table 21. Almost half of respondents reported to be slightly confident in providing information on OA (n = 57), 33.6% reported to be slightly unconfident (n = 41). Just under 10% reported to be extremely confident (n = 8), while 11.5% reported to be extremely unconfident. One respondent reported to refuse to answer questions on OA, but in a comment box on the questionnaire explained that ““I'm Confident, Not Unconfident or Extremely Confident but Confident.”

Table 21

Level of Confidence in Providing Information on Organic Agriculture

Level of Confidence	*f*	%
Extremely confident	8	6.7
Slightly confident	55	46.2
Slightly unconfident	41	34.5
Extremely unconfident	14	11.8
I refuse to answer questions on organic agriculture	1[a]	0.8

[a]Respondent explained in later comment "I'm Confident, Not Unconfident or Extremely Confident but Confident."

Respondents were asked to rank the usefulness of resources for information on OA. Table 22 lists the resources most rated very useful. Website with organic information and printable publications received were ranked very useful by over 60% or respondents while extended training for college credit was ranked least useful. Respondents were provided a comment box to provide further suggestions. The only comment submitted in this section was "not enough interest for Extension to allocate time in this area."

Table 22

Ranking of Usefulness of Information Sources

Sources of Information	Not at all useful		Not very useful		Somewhat useful		Very Useful	
	f	%	*f*	%	*f*	%	*f*	%
Website with organic information	1	0.8	6	5.0	35	29.4	77	64.7
Printable organic publications available online	1	0.8	3	2.5	39	32.8	76	63.9
Extension workshop	2	1.7	15	12.6	67	56.3	35	29.4
Field days at organic farms	15	12.6	24	20.2	50	42.0	30	25.2
Protocol for organic demonstration/trial plots	8	6.7	25	21.0	57	47.9	29	24.4
Online training modules for agents	4	3.4	26	21.8	63	52.9	26	21.8
Extended training for college credit	46	38.7	37	31.1	27	22.7	9	7.6

Note. Scale: 1 = *Not at all useful,* 2 = *Not very useful,* 3 = *Somewhat useful,* 4 = *Very useful.*

Interest in Training on Organic Agriculture

Survey respondents were asked to indicate their interest in training on OA. The section began with the statement "I am interested in training on" and was followed by a list of 9 different topics and agricultural practices related to OA. Respondents were asked to indicate their level of interest using the following five point scale: strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. Respondents were most interested in training on organic soil fertility management (M = 3.86, SD = .905), organic insect management (M = 3.83, SD = .924), organic disease management (M = 3.80, SD = .926), and organic weed management (M = 3.80, SD = .939). The topics with the lowest level of interest were marketing organic products (M = 3.34, SD = 1.122), organic certification (M = 3.31, SD = 1.056), and transitioning to OA (M = 3.18, SD = 1.071). The mean and standard deviation for each statement are displayed in Table 23.

Table 23

Interest in Participating in Training on Topics in Organic Agriculture

Topic	*N*	*M*	*SD*
Organic soil fertility management	119	3.86	.905
Organic insect management	119	3.83	.924
Organic disease management	119	3.80	.926
Organic weed management	119	3.79	.938
Organic agriculture in general	119	3.59	.868
Organic agricultural production systems	119	3.46	.946
Marketing organic products	119	3.34	1.122
Organic certification	119	3.31	1.056
Transitioning to organic agriculture	119	3.18	1.071

Note. Scale: 1 = *Strongly disagree,* 2 = *Disagree,* 3 = *Neither disagree nor agree,* 4 = *Agree,* 5 = *Strongly agree.*

Objective Four: Findings

The fourth objective was to determine respondents' perceptions of OA. Respondents were provided a list of ten statements and requested to indicate their level of agreement with each statement using the following five-point scale: strongly disagree, disagree, neither disagree nor agree, agree, or strongly agree. Respondents tended to somewhat agree with the statement, "crops, with the potential for sustaining or

increasing production with limited inputs, should receive more research emphasis" (*M* = 3.62, *SD* = .892). Respondents tended to disagree with the statement, "chemical residues on many fruits and vegetables pose a significant risk to the consumer" (*M* = 2.22, *SD* = .984). The mean and standard deviation for each statement are displayed in Table 24.

Table 24

Respondents' Perception of Organic Agriculture

Statement	N	M	SD
Crops, with the potential for sustaining or increasing production with limited inputs, should receive more research emphasis.	119	3.62	.892
Organic agriculture is a niche market that will never be a major component of U.S. agriculture.	119	3.39	1.074
Most organic agricultural practices can be successfully implemented in my county.	119	2.97	.952
Organic pest control methods would reduce the amount of pesticides used, which would contribute to the reduction of pesticide pollution.	119	2.92	1.005
Many organic practices that are used successfully in other states, will not work in Texas.	119	2.89	.674

Table 24. Cont.

Statement	N	M	SD
Agricultural systems using crop rotations, green manure crops, and animal manures can be economically comparable to a traditional system that uses synthetic fertilizers.	119	2.82	.945
Most insects can be successfully managed without the use of synthetic insecticides.	119	2.68	.974
Most plant diseases can be successfully managed without the use of synthetic fungicides.	119	2.64	.871
Most weeds can be successfully managed without the use of synthetic herbicides.	119	2.61	1.002
Chemical residues on many fruits and vegetables pose a significant risk to the consumer.	119	2.22	.984

Note. Scale: 1 = *Strongly disagree,* 2 = *Disagree,* 3 = *Neither disagree nor agree,* 4 = *Agree,* 5 = *Strongly agree.*

Objective Five: Findings

The fifth objective was to determine respondents' perceptions of TAES' involvement in OA. Respondents were provided a list of eight statements and requested to indicate their level of agreement with each statement using the following five-point

scale: strongly disagree, disagree, neither disagree nor agree, agree, or strongly agree. Respondents tended to somewhat agree with the statement, “My supervisors would be supportive of me increasing my amount of programming on organic agriculture” (*M* = 3.46, *SD* = .674). Respondents tended to disagree with the statement, “Texas AgriLife Extension Service has provided adequate training for extension agents in areas of organic agriculture” (*M* = 2.39, *SD* = .805). Respondents also tended to disagree with the statement, “it is not the job of Texas AgriLife Extension Service to provide information on organic agriculture” (*M* = 1.87, *SD* = .736). The mean and standard deviation for each statement are displayed in Table 25.

Table 25

Respondents' Perception of TAES’ Involvement in Organic Agriculture

Statement	N	M	SD
My supervisors would be supportive of me increasing my amount of programming on organic agriculture.	119	3.46	.674
More time and adequate funding should be set aside for training in the area or organic agriculture.	119	3.23	1.004
Texas AgriLife Extension Service should do more to support organic farmers.	119	3.18	.820
Texas AgriLife Extension Service has ignored organic farmers way too much in the past.	119	2.90	.969

Table 25. Cont.

Statement	N	M	SD
Texas AgriLife Extension Service currently has the capabilities needed to meet the educational needs on organic agriculture.	119	2.87	.962
Texas AgriLife Extension Service provides the major leadership in areas of organic agriculture in my county.	119	2.72	.882
Texas AgriLife Extension Service has provided adequate training for extension agents in areas of organic agriculture.	119	2.39	.805
It is not the job of Texas AgriLife Extension Service to provide information on organic agriculture.	119	1.87	.736

Note. Scale: 1 = *Strongly disagree,* 2 = *Disagree,* 3 = *Neither disagree nor agree,* 4 = *Agree,* 5 = *Strongly agree.*

Objective Six: Findings

The sixth objective was to determine what relationships exist between the primary variables of interest. An alpha level of 0.05 was set a priori.

Level of Interest

Bivariate correlations were run on respondent personal characteristics and primary variables of interest to determine what relationships existed (Table 26). There

was a positive and significant relationship between a county's change in interest in OA and current level of interest, r = -.568, respondents' interest in training, r = .313, respondents' perception of OA, r = .235, and respondents' perception of TAES role in OA, r = .346 (all p's <.05). This indicated that as the respondent's perceived change in interest increased, their perception of the current level of interest in OA increased, their interest in training increased, they had a more positive perception of OA, and perceived that TAES should increase its role in OA.

While the county's current level of interest had significant relationships with many of the same variables, it also had significant relationships with other variables. It had a negative and significant relationship with number of years employed by TAES, r = -.075, a negative and significant relationship with population density of county, r = -.350, a positive and significant relationship with interest in training, r = -.545, a positive and significant relationship with perception of OA, r = -.512, and a positive and significant relationship with perception of TAES' involvement in OA, r = -.297, (all ps < .05). This suggests that newer CEA in more populated counties perceived there to be a higher level of interest in OA. These CEA also had a more positive perception of OA and TAES' role in OA.

There was a positive and significant relationship between interest in training and a county's perceived current level of interest in OA, r = .545, p < .05. There was also a positive and significant relationship with perception of OA, r = .491, and perception of TAES' involvement in OA, r = .603 (both ps < .05). There was a negative and significant relationship between interest in training and years employed by TAES,

Table 26

Correlations of Variables of Interest ($N = 119$)

Variable	Change in interest	Current interest	Age	Gender	Years employed	Pop. density	Interest in training	Perception of OA	Perception of TAES
Change in interest	1								
Current interest	.568*	1							
Age	-.130	.025	1						
Gender	.164	.274*	.171	1					
Years employed	-.154	-.075*	.573*	-.299*	1				
Population density	-.125	-.350*	-.173	-.201*	-.052	1			
Interest in training	.313*	.545*	-.027	.330*	-.238*	-.244*	1		
Perception of OA	.235*	.297*	-.112	.127	-.185*	.001	.491*	1	
Perception of TAES	.346*	.512*	.061	.294*	-.127	-.127	.603*	.386*	1

* Correlation significant at .05 level (2-tailed).

r = -.238, p < .05. This indicated that as respondents' perception of OA and TAES role in OA increased their interest in training also increased. As the number of years a respondent worked for TAES increased, though, their interest in training in OA decreased.

Objective Seven: Findings

The seventh objective was to determine if any personal characteristic variables predicted respondents' perception of OA.

A stepwise multiple regression was run to determine which, if any, personal characteristics predicted respondents' perceptions of OA. The following variables were included in the regression: age, gender, and years employed by TAES. It was found that years worked for TAES explained 3.4% of variability in respondents' perceptions of OA, $F(1,117) = 4.162$, $p<.05$, Table 27. Multicolinearity was examined using VIF and tolerance values, both of which met the assumptions of no multicolinearity, VIF=1.119, tolerance = 0.915. This indicated that as respondents' perception of OA increased, the number of years they had worked for TAES decreased. While this model was significantly better at predicting respondents' perceptions of OA than the mean, the model did not explain much of the variability in respondents' perceptions of OA.

Table 27

Summary of Stepwise Multiple Regression Analysis for Variables Predicting Perception of Organic Agriculture (N = 119)

Variable	*B*	*SE B*	β
Years worked for TAES	-0.109	.054	-.185*

Note. R^2 = .034. *p< .05

Objective Eight: Findings

The eighth objective was to determine what variables predict respondents' perceptions of TAES' involvement in OA.

A stepwise multiple regression was run to determine which, if any, personal characteristics predicted respondents' perceptions of TAES' involvement in OA. The following variables were included in the regression: age, gender, population density of county, and years employed by TAES. It was found that gender explained 8.7% of variability in respondents' perceptions of TAES' involvement in OA, $F(1,117) = 11.105$, $p<.05$, Table 28. Multicolinearity was examined using VIF and tolerance values, both of which met the assumptions of no multicolinearity, VIF=1.05, tolerance = 0.947. This indicated that of the respondents' personal characteristics, gender was the primary predictor of their perceptions of TAES' role in OA with females having a more positive perception of TAES role in OA than males. While this model was significantly better at predicting respondents' perceptions of TAES role in OA than the mean, the model did not explain much of the variability in respondents' perceptions of TAES' role in OA.

Table 28

Summary of Stepwise Multiple Regression Analysis for Variables Predicting Perception of TAES' Capabilities and Role Related to Organic Agriculture (N = 119)

Variable	*B*	*SE B*	β
Gender	0.528	0.158	.294*

Note. Scale: 1 = Male, 2 = Female; R^2 = .087. *p< .001

Objective Nine: Findings

The ninth objective was to determine what variables predict respondents' interest in participating in training on OA.

A stepwise multiple regression was run to determine which, if any of the primary variables of interest predicted respondents' interest in training on OA. The following variables were included in the regression: age, gender, population density of county, years employed by TAES, change in interest in OA, current level of interest in OA, perception of OA, and perception of TAES' involvement in OA. It was found that respondents' perception of TAES' involvement in OA, their perception of OA, their perception of their county's current level of interest in OA, and the number of years employed by TAES explained 51% of variability in respondents' perceptions of TAES' involvement in OA, $F(4, 103) = 25.633$, $p<.05$, Table 29. Multicolinearity was examined using VIF and tolerance values, both of which met the assumptions of no multicolinearity, VIF=1.299, tolerance = 0.790. This indicated that of the variables

Table 29

Summary of Stepwise Multiple Regression Analysis for Variables Predicting Interest in Training (N = 119)

Variable	*B*	*SE B*	β
Model 1			
Perception of TAES Role	0.75	0.09	.60*
Model 2			
Perception of TAES Role	0.60	0.10	.48*
Perception of OA	0.40	0.10	.31*
Model 3			
Perception of TAES Role	0.44	0.11	.35*
Perception of OA	0.37	0.10	.29*
Perceived current level of interest in OA	0.20	0.07	.25*
Model 4			
Perception of TAES Role	0.43	0.11	.35*
Perception of OA	0.35	0.10	.27*
Perceived current level of interest in OA	0.20	0.07	.25*
Years worked for TAES	-.113	.055	-.147*

Note. R^2 = .36 for Model 1; R^2 = .44 for Model 2; R^2 = .50 for Model 3.
*$p<.05$

regressed with interest in training, perception of OA, perception of TAES' role in OA, county's perceived current interest in OA, and years employed by TAES explained over half of the variability of respondents' interest in training. The more positive perception respondents had of OA and TAES' role in OA the more interest they had in training. Also, CEA with fewer years working for TAES and higher perceived levels of interest in OA in their county were also more likely to express an interest in training. Respondents' perception of TAES' role in OA explained the most variability, with an increase of .429 for every unit increase in interest in training. This model was significantly better at predicting respondents' interest in participating in training on OA than the mean, and the model explained over 50% of the variability in respondents' interest in participating in training on OA (Figure 4).

Objective Ten: Findings

The tenth objective was to determine if any statistically significant differences existed between personal characteristics on the primary variables of interest.

Gender

Independent *t*-tests were run to determine if there were differences between males and females on their perceptions of OA, their perceptions of TAES' involvement in OA, and their interest in training on OA (Table 30). On average, females had a more positive perception of OA (M = 2.83, SE =.601) than males (M = 2.61, SE = .627). This

difference was not statistically significant $t(117) = -1.38$, $p > .05$, and represented a small sized effect $r = .13$.

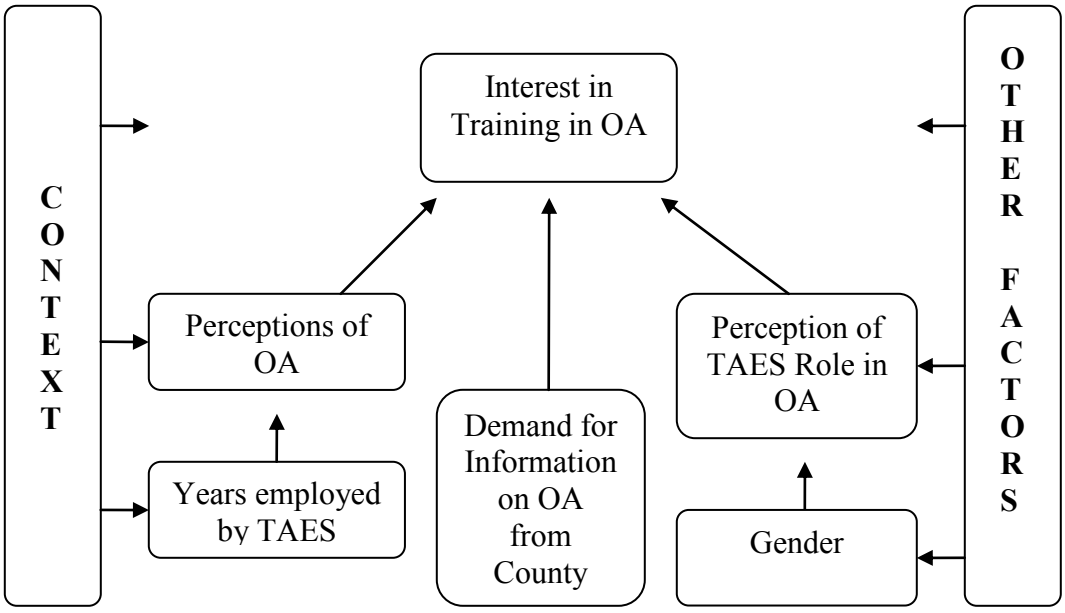

Figure 4. Modified Conceptual Framework for Factors Influencing CEA's Interest in Training in OA.

There was a statistically significant difference between males and females in their perception of TAES' involvement in OA with females perceiving that TAES should be more involved in OA ($M = 3.83$, $SE = .500$) than males ($M = 3.30$, $SE = .619$), $t(117) = -3.332$, but this only represented a small sized effect $r = .29$.

There was a statistically significant difference between males and females in their interest in training in OA with females on average having more interest ($M = 4.20$,

SE =.601) than males (*M* = 3.47, *SE* = .763), *t*(117) = -3.332, and represented a medium sized effect *r* = .33.

Table 30

Analysis of Variance for Primary Variables by Gender

Construct	*n*	*M*	*SD*	*t*	*p*
Perception of OA					
Male	102	2.61	.627	-1.381	.170
Female	17	2.83	.601		
Perception of TAES' Involvement in OA					
Male	102	3.30	.619	-3.332	.001*
Female	17	3.83	.500		
Interest in Training in OA					
Male	102	3.47	.763	-3.780	.000*
Female	17	4.20	.601		

*$p < .05$

Age

One-way analyses of variance were run to determine if there were differences between the different age groups of respondents on their perceptions of OA, their perceptions of TAES' involvement in OA, and their interest in training on OA (Table 31). Respondents over 50 years old perceived OA to be less viable than all the other

respondent age groups (M = 2.44, SD = .648), while respondents between 31 and 40 years old perceived it to be more viable (M = 2.81, SD = .497). This difference was not significant $F(3, 115) = 1.553$, $p > .05$, and represented a small sized effect r = .20. All four age groups were within 0.20 of the overall mean (M = 2.64, SD = 626); thus, on average most respondents neither agreed nor disagreed with statements affirming the viability of OA.

There was some variability in perceptions of TAES' involvement in OA by age group as well, but it was not statistically significant. Respondents between 20 and 30 years old had the lowest score on the perception of TAES' involvement in OA (M = 3.24, SD = .591), while respondents between 31 and 40 had the highest average score (M = 3.44, SD = .497). This difference was not statistically significant $F(3, 115) = 1.553$, $p > .05$, and represented a small sized effect r = .20. All four age groups were within 0.15 of the total mean (M = 3.379, SD = .630); thus, on average most respondents neither agreed nor disagreed with statements advocating TAES' involvement in OA.

There was some variability in interest in training in OA by age group as well, but it was not statistically significant. On average, respondents most interested in training on OA were between 31 and 40 years old (M = 3.71, SD = .716) while respondents over 50 years old had the lowest interest (M = 3.45, SD = .797). This difference was not statistically significant $F(3, 115) = .550$, $p > .05$, and represented a small sized effect r = .12. All four age groups were within 0.15 of the total mean (M = 3.57, SD = .783); thus, on average most respondents neither agreed nor disagreed with statements advocating TAES' involvement in OA.

Table 31

Analysis of Variance for Primary Variables by Age

Construct	*n*	*M*	*SD*	*F*	*p*
Perception of OA					
20-30	23	2.62	.620	1.553	.205
31-40	26	2.81	.497		
41-50	45	2.67	.669		
Over 50	25	2.44	.648		
Perception of TAES' Involvement in OA					
20-30	23	3.24	.591	.506	.679
31-40	26	3.44	.727		
41-50	45	3.41	.617		
Over 50	25	3.37	.596		
Interest in Training in OA					
20-30	23	3.49	.644	.550	.649
31-40	26	3.71	.716		
41-50	45	3.60	.881		
Over 50	25	3.45	.797		

Years Employed by TAES

One-way analyses of variance were run to determine if there were differences on the primary variables of interest by the number of years they had been employed by

TAES (Table 32). Respondents employed by TAES for over 20 years perceived OA to be less viable than all the other year ranges ($M = 2.46$, $SD = .645$), while respondents employed for less than 5 years perceived it to be more viable ($M = 2.81$, $SD = .630$). This difference was not statistically significant $F(3, 115) = 1.414$, $p > .05$, and represented a small sized effect $r = .19$. All four age groups were within 0.20 of the total mean ($M = 2.64$, $SD = .626$); thus, on average most respondents neither agreed nor disagreed with statements affirming the viability of OA.

There was some variability in perceptions of TAES' involvement in OA by years employed as well, but mean differences were not statistically significant. Respondents employed for between 5-10 years ($M = 3.36$, $SD = .764$) and 11-20 years ($M = 3.36$, $SD = .743$) had the lowest score on the perception of TAES' involvement in OA, while respondents employed for less than 5 years by TAES had the highest average score ($M = 3.51$, $SD = .334$). This difference was not statistically significant $F(3, 115) = .720$, $p > .05$, and represented a small effect size $r = .14$. All four groups were within 0.15 of the total mean ($M = 3.38$, $SD = .630$); thus, on average respondents were ambivalent about TAES' involvement in OA regardless of the number of years employed by TAES.

There was some variability in interest in training in OA by years employed as well, but it was not statistically significant. On average, respondents most interested in training on OA have been employed by TAES for less than 5 years ($M = 3.83$, $SD = .576$) while respondents employed for over 20 years had the lowest interest ($M = 3.23$, $SD = .828$). This difference was not statistically significant $F(3, 115) = .058$, $p > .05$, and represented a small sized effect $r = .25$.

Table 32

Analysis of Variance for Primary Variables of Interest by Years Employed by TAES

Construct	*n*	*M*	*SD*	*F*	*p*
Perception of OA					
< 5 years	31	2.81	.630	1.414	.242
5 - 10 years	28	2.65	.610		
11 - 20 years	39	2.59	.611		
> 20 years	21	2.46	.645		
Perception of TAES' Involvement in OA					
< 5 years	31	3.51	.334	.720	.542
5 - 10 years	28	3.36	.764		
11 - 20 years	39	3.36	.743		
> 20 years	21	3.25	.539		
Interest in Training in OA					
< 5 years	31	3.83	.576	2.572	.058
5 - 10 years	28	3.58	.727		
11 - 20 years	39	3.55	.887		
> 20 years	21	3.23	.828		

Primary Agent Responsible for Information on Organic Agriculture

Independent *t*-tests were run to determine if there were differences on the primary variables of interest by agent responsible for information on OA in their county (Table 33). There was no statistically significant differences on perceptions of OA, $t(117) = -1.563$, $p > .05$, and yielded a small effect size of $r = .14$. There was also no statistically significant difference on perceptions of TAES' involvement by agents responsible for information on OA, $t(117) = -.542$, $p > .05$, and represented no effect $r = .05$. There was a statistically significant difference in interest in training, $t(117) = .303$, $p < .05$, and represented a medium effect size of $r = .43$. Thus, respondents' perceptions of OA and TAES' role in OA did not differ by their level of responsibility for information on OA. Their interest in training, though, did differ by level of responsibility for information on OA.

Population Density of County

One-way analyses of variance were run to determine if there were differences on the primary variables of interest by population density of respondents' counties (Table 34). There was no statistically significant differences on perceptions of OA, $F(2, 116) = .033$, $p > .05$, and represented no effect $r = .02$. There was also no statistically significant difference on perceptions of TAES' involvement by population density, $F(117) = -.542$, $p > .05$, and represented a small sized effect $r = .12$. There was a statistically significant difference in interest in training, $F(2, 116) = .366$, $p < .05$; however, it represented a small effect size of $r = .24$. Fisher's test of least significant differences was employed

Table 33

Independent Samples t-test for Primary Variables by Primary Agent Responsible for Information on Organic Agriculture

Primary Agent Responsible	*n*	*M*	*SD*	*t*	*p*
Perception of OA					
Yes	103	2.61	.613	-1.563	.121
No	16	2.87	.676		
Perception of TAES' Involvement in OA					
Yes	103	3.37	.621	-.542	.589
No	16	3.46	.702		
Interest in Training					
Yes	103	3.52	.761	-1.991	.049*
No	16	3.93	.855		

*$p < .05$

to determine where the differences were, and found that CEA in urban counties (M = 4.02, SD = .699) were significantly different from rural counties (M = 3.47, SD = .789). Thus, while there were no statistically significant differences in perception of OA or TAES' role in OA by population density of county, there was a difference in interest in training with CEA in urban counties significantly more interested in training than CEA in rural counties.

Table 34

Analysis of Variance for Primary Variables of Interest by Population Density of County

Construct	*n*	*M*	*SD*	*F*	*p*
Perception of OA					
Urban	14	2.66	.657	.033	.967
Suburban	16	2.61	.388		
Rural	89	2.65	.660		
Perception of TAES' Involvement in OA					
Urban	14	3.57	.746	.947	.391
Suburban	16	3.45	.838		
Rural	89	3.37	.567		
Interest in Training in OA					
Urban	14	4.02	.699	3.664	.029*
Suburban	16	3.75	.677		
Rural	89	3.47	.790		

*p <.05

CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter provides a summary of this study's purpose, objectives, and methods. Conclusions, implications, and recommendations originating from this study's results and other current literature are provided for each objective of this study. The last section of this chapter provides recommendations arising from the results of this research, and recommendations for future research.

Summary of the Study

OA is the fastest growing sector in agriculture, and production is not able to keep up with consumer demand. As the profitability in OA has increased, more farmers have expressed an interest in OA. One of the primary barriers to adoption of OA has been a lack of government and institutional support.

Texas AgriLife Extension Service has noted the growing interest in OA, and in 2010 it developed the organic working group to address this interest. This working group established four primary goals with the first critical goal being a survey of Texas CEA to determine how much demand they are receiving from their constituents for information on OA, which resources would be most useful to them, and their perception of OA.

Summary of Purpose and Objectives

The purpose of this study was to determine Texas AgriLife Extension agents' perceptions of organic agriculture and implications for training. This research followed Fishbein and Ajzen's (1975) theory of attitude as a predictor of behavior, which states that a person's attitudes and beliefs toward a behavior, the relative importance of that behavior, and the subjective norms associated with that behavior will all predict an individual's intention to perform that behavior. This theory was to be applied by accomplishing the following research objectives:

1. Describe personal and situational characteristics of TAES CEA (age, gender, years employed by TAES, CEA position, and population density of county).
2. Determine the perceived level of demand for information on OA CEA are receiving in their respective counties.
3. Determine CEA's level of prior training related to OA, and their preferences for future resources and training.
4. Describe CEA's perceptions of OA.
5. Describe CEA's perceptions of TAES' involvement in OA.
6. Determine what significant relationships exist between CEA personal characteristics, interest in training, perceptions of OA, and perceptions of TAES involvement in OA.
7. Determine which, if any, variables predict CEA's perceptions of OA.
8. Determine which, if any, variables predict CEA's perception of TAES' capabilities and role in relation to OA.

9. Determine which, if any, variables predict CEA's level of interest in training in OA.
10. Determine if any statistically significant differences exist in the primary variable of interest based on personal characteristics.

Summary of Methodology

The target population for this study was CEA employed by TAES with primary responsibilities in the agriculture and natural resource program area. This included extension agents in five CEA roles: agriculture (AG), agriculture and natural resource (AG/NR), horticulture (HORT), integrated pest management (IPM), and natural resource (NR). A pilot study was conducted with the instrument to analyze content validity and reliability. Reliability was calculated for each internal scale using Cronbach's (1951) coefficient alpha.

The initial survey request was sent out by TAES regional program directors in an email message with a URL link to the online questionnaire. Respondents were requested to enter their email address to verify the random sample and track non-respondents. A second request was sent out two weeks later, achieving a final response rate of 81.5% (n = 123). Non-response error was analyzed using one of the methods recommended by Lindner, Murphy, and Briers (2001). Early and late respondents were grouped, and independent t-tests were run to determine if there were any statistically significant differences between the two groups. No statistically significant differences were found between the two groups on any of the primary variables of interest.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 16.0. Of the 123 responses, 4 were excluded due to missing data, leaving 119 usable responses. Objectives 1-5 were accomplished using descriptive methods including frequencies and percentages. Correlation was used to accomplish objective six. Multiple regressions were run to accomplish objectives 7-9, while objective 10 was accomplished using one way analyses of variance.

The independent variables in this study were (a) age, (b) gender, (c) CEA position, (d) population density of county, and (e) years employed by TAES. The dependent variables were (a) perception of OA, (b) perception of TAES' involvement in OA, and (c) interest in training in OA.

Conclusions and Implications

Objective One: Conclusions

The first objective was to describe the personal characteristics of respondents. Six demographic variables were measured: (a) age, (b) gender, (c) CEA position, (d) years employed by TAES, (e) population density of county, and (f) responsibility for information on OA.

More than one-third of the respondents were between 41 and 50 years of age (n = 45, 37.8%), with the other respondents being fairly evenly distributed between the other three age groups: 20-30 years of age (n = 23, 19.3%), 31-40 years of age (n = 26, 21.8%), and >50 years of age (n = 25, 21.0%). A large majority of respondents were

male (*n* = 102, 85.7%), with less than 15% of respondents reporting to be female (*n* = 17).

All five CEA positions in the Agriculture and Natural Resource program areas were represented. A majority of respondents were agriculture and natural resource agents (*n* = 84, 70.6%). Agriculture agents represented 10.9% of respondents (*n* = 13), horticulture agents, 9.2% (*n* = 11), integrated pest management, 7.6% (*n* = 9), and natural resource, 1.7% (*n* = 2). These percentages were fairly representative of the target population.

A plurality of respondents had been employed by TAES for 11 to 20 years (*n* = 39, 32.8%), but there were also quite a few respondents that had been employed by TAES for less than 5 years (*n* = 31, 26.1%). The smallest group was respondents that had worked for TAES for over 20 years (*n* = 21, 17.6%).

A majority of respondents reported their counties to be rural (*n* = 89, 74.8%). Respondents from suburban counties accounted for 13.4% of responses (*n* = 16), and respondents from urban counties accounted for 11.8% (*n* = 14). This is fairly representative of the state, as only 36 of the state's 254 counties have more than 100 people per square mile (U.S. Census Bureau, 2000).

A majority of respondents reported they are the primary agent in their county responsible for information on OA (*n* = 103, 86.6%), with only 13.4% indicating they were not primarily responsible for that information (*n* = 16). When a cross-tabulation was run on responsibility for information on OA and CEA position, it was found that there was no difference between CEA positions.

Objective One: Implications

This study focused on the five CEA positions involved in the TAES agriculture and natural resource programming area. Almost all of Texas' 254 counties contain at least one agent responsible for agriculture and natural resource programming, with some counties having multiple agents in this program area. It was expected that this research would find certain CEA positions to hold more responsibility for information on OA than others. The results of the cross-tabulation between responsibility for information on OA and CEA position revealed a majority of AG, AG/NR, and HORT CEA reported to be the primary CEA responsible for information on OA, while more than 50% of IPM CEA and both NR CEA reporting indicated they were not.

Objective Two: Conclusions

The second objective was to determine CEA's perceived level of demand for information on OA in their respective counties.

Over 50% of respondents noted interest in OA had increased in their county over the past five years. One third of respondents indicated the level of interest had remained the same over the past five years, and only five percent of respondents indicated a decrease in interest. Three percent indicated there had been no interest in OA in their county (n = 4, 3.4%), and 10.1% indicated they did not know (n = 12). Most respondents indicated the current level of interest in OA was low to moderate. A few respondents indicated they were experiencing more elevated levels of interest. Ten percent of respondents indicated a high level of interest and 2.5% indicated an extremely high level

of interest. A cross-tabulation revealed that those indicating extremely high levels of interest were in urban (n = 2) and suburban counties (n = 1).

Respondents reported the primary audience for information on OA was gardeners and homeowners. This research found the current primary audience for information on OA was gardeners and homeowners, which also appears to be TAES' primary audience for most information. A keyword search of TAES' reporting system for CEA found CEA conducted 6,508 sessions for gardeners, for a total of 2,741,350 contact hours (TAES, 2011). A task keyword search for farmers found CEA conducted 582 sessions for farmers with a total of 1,675,799 contact hours (TAES, 2011). Full-time farmers and ranchers and other CEA were the least cited audience in this study, which is reflected in one of the comments provided by a respondent: "I do my best to help gardeners and homeowners with an interest in utilizing organic methods, but the fulltime producers have not shown an interest."

Objective Two: Implications

This finding reflects the information found in other sources. According to the 2007 agricultural census, fewer than 700 of the 247,000 or 0.3% of farms and ranches in Texas reported to be using organic agricultural practices (USDA, 2008). While there may not be many organic farms or ranches in Texas, there is growing interest in OA. Constance and Choi (2010) found that 40% of the conventional farmers they surveyed in Texas had at least some interest in OA. Texas farmers and ranchers may be using alternative sources of information on OA due to the historical sociopolitical conflict

between the LGUS and proponents of OA. In OFRF's third survey of U.S. organic farmers the most utilized sources of information on OA were other farmers, field consultants, suppliers, and growers' associations (Walz, 1999). The least cited sources were cooperative extension, state departments of agriculture, and USDA offices. OFRF's findings were supported by comments from respondents from this dissertation research. As one respondent noted, "We should have been doing more on organic farming before now," while another stated, "Many organic farmers have either learned to be sucessful [*sic*] on there [*sic*] own or have gone out of business. We missed the early boat on being a leader in organic agriculture."

While organic farmers may not be utilizing TAES, gardeners and homeowners are. Gardeners are a significant audience for CEA, accounting for a lot of TAES programming. TAES started the Texas Master Gardener (TMG) program in 1978, and it has had a significant impact on TAES' outreach. In 2009 the 6,393 TMG volunteers contributed more than 520,000 hours in 2009, answering 32,557 phone calls, maintaining 212 demonstration gardens and assisting with 273 youth gardens (Texas Master Gardener, 2009). TMG provides a captive audience for CEA and TAES.

Objective Three: Conclusions

The third objective was to determine CEA's level of prior training related to OA, and their preferences for future resources and training. Most of the previous training CEA had participated in related to OA was informal training while the least cited

sources were formal sources of training. Over 20% of respondents, though, indicated they had not had any experience or training related to OA.

Most respondents were interested in training on OA. Topics receiving the most interest were soil, weed, disease, and insect management in organic systems, while there was less interest in marketing, organic certification, and transitioning to OA. Respondents included a few more suggestions for topics in the comment box on the questionnaire. One respondent noted an interest in "animal related" topics. Another respondent noted gardeners and homeowners were their primary audience and "resources for homeowners and gardeners are the most important." One respondent noted that while their constituents use some organic methods, their goal is to be as "natural as possible" but "they are not affraid [*sic*] of chemicals."

Respondents indicated the most useful resources for information on OA were a website and print publications. There was also interest in extension workshops and field days on organic farms.

Objective Three: Implications

The lack of formal training reported by CEA reflects the lack of research and information on organic agriculture from the LGUS. Lipson (1997) reported that less than 0.1% of USDA funding had supported research on OA. Creamer, Baldwin, and Louws (2000) stated this lack of research and information on OA has led many to perceive the LGUS to be "unresponsive" to the needs of organic farmers. Organic farmers indicated "uninformed or uncooperative extension agents" as a barrier to OA, thus reinforcing the

lack of information and CEA training as a barrier (Walz, 1999). Federal funding for OA research has drastically increased, but OA research in Texas lags significantly behind other states. In OFRF's review of OA research at LGUC the only OA research in Texas was on organic rice production at the Texas Agriculture Research Center in Beaumont (Sooby, 2003).

Objective Four: Conclusions

The fourth objective was to describe CEA's perceptions of OA. CEA indicated the most agreement with the statement "Crops, with the potential for sustaining or increasing production with limited inputs, should receive more research emphasis" (M = 3.62, SD = .892). The statement with the second highest level of agreement was "Organic agriculture is a niche market that will never be a major component of U.S. agriculture" (M = 3.39, SD = 1.074). On average, CEA did not agree or disagree with statements regarding the viability of organic agricultural practices. Organic weed management was the organic agricultural practice that received the most disagreement (M = 2.61, SD = 1.002). After recoding negative statements an average score was calculated for CEA's perception of the viability of OA (M = 2.80, SD = .538). Thus, the construct indicated an overall slightly negative perception of OA. Respondents' comments provide a richer picture.

Respondents' comments primarily revolved around two main themes, organic as a niche market and respondents' rejection of any scientific basis for OA. Some respondents indicated OA had created markets "obtainable to local producers who want

to produce targeted products," while one respondent felt organic was "a hoax that people use to charge more for their product." Another respondent indicated they thought it was "a marketing scheme not sound agriculture."

Many of comments respondents provided indicated they did not think there was any science supporting OA. One respondent alluded to the "many myths about organic agriculture" while another thought organic farmers "often reject good science based information for anecdotal, feel good methods that may not necessarily be effective." Respondents also explained they did not feel OA was productive enough to feed the global population: "I believe that AgriLife should have information and be a resource for organic information but I do not believe we should be an advocate as you will never be able to support the growing population with organic farming."

Objective Four: Implications

Most of the previous research on CEA's attitudes and perceptions has looked at SA and found respondents did not have a clear understanding of what SA was (Agunga, 1995; Conner & Kolodinsky, 1997; Jayartne, Martin & DeWitt, 2001). Not many studies have examined CEA's perceptions of OA. Lipson (1997) argued that the federal government and LGUS were more receptive to the term "sustainable agriculture" and have been resistant to using the "o-word." While this study examined CEA's perceptions of organic agriculture, the results of this research were similar to previous studies on CEA's attitudes and perceptions of SA. Many other studies found that CEA did not perceive alternative agricultural systems to be economically viable (Agunga, 1995;

Creamer, Baldwin, & Louws, 2000; Jayaratne, Martin, & DeWitt, 2001; Paulson, 1995). Respondents in this study did not perceive OA to be economically viable, and expressed ambivalence toward the viability of OA practices. Respondents' comments indicated that they did not think OA was scientifically based nor could OA feed the world's population.

According to Fishbein and Ajzen's (1975) model of reasoned action, behavior is determined by an individual's beliefs and attitude toward an object, the normative beliefs or social pressure they experience, and the relative importance of the behavior. This construct examined CEA's perceptions of OA, which determine an individual's attitude toward OA. Since CEA in this study had a generally ambivalent attitude toward OA, and indicated they did not perceive there to be much demand for information on OA, TAES will need to advocate for programming and training in OA if TAES intends to increase their involvement. The training would need to focus not only on content, but alsoon attitude and educational methods as well.

Objective Five: Conclusions

The fifth objective was to describe CEA's perceptions of TAES' involvement in OA. On average, respondents neither agreed nor disagreed with many of the statements regarding TAES' role and involvement in OA. The statement receiving the most agreement by respondents was "My supervisors would be supportive of me increasing my amount of programming on organic agriculture" (M = 3.46, SD = .674). The statement receiving the second highest level of agreement was "More time and adequate

funding should be set aside for training in the area of organic agriculture" (*M* = 3.23, *SD* = 1.004). One respondent put it simply: "We need more training." This comment was supported by the level of disagreement with the statement "Texas AgriLife Extension Service has provided adequate training for extension agents in areas of organic agriculture" (*M* = 2.39, *SD* = .805). Another respondent also commented on the lack of support they received from TAES specialists: "I have requested additional information from specialists in College Station and never received responses. Consequently, I had to rely on the information available on the web at the time."

Other statements in this construct focused on TAES' previous, current, and future involvement in OA. Most respondents disagreed with the statement "It is not the job of Texas AgriLife Extension Service to provide information on organic agriculture" (*M* = 1.87, *SD* = .736). As respondents noted in their current level of demand and in comments they provided, though, they do not perceive there to be many of their constituents interested in OA. CEA neither disagreed nor agreed with the statement, "Texas AgriLife Extension Service provides the major leadership in areas of organic agriculture in my county," but some of the respondents commented that those individuals interested in OA have sought out other sources for information on OA: "the county clientele realize that Extension is NOT the place to get this kind of information - radio shows and newspapers have garden enthusiast that reinforce this notion." Another respondent noted, "We missed the early boat on being a leader in organic agriculture. That's not to say that we shouldn't try to train our agents to be knowledgeable in this area, just that it may be difficult to establish ourselves now as a leader in organic production practices." This

issue of TAES' involvement in OA then brought up the question of how TAES should be involved, and many of the respondents' comments indicated they felt TAES should support OA, not advocate it: "I do not believe we as agents need to promote it,,,, [*sic*] only support it," and "Extension should never promote organics."

Many respondents' comments also questioned where other current TAES program initiatives such as IPM and EarthKind fit in the picture of OA. One respondent noted there are other TAES "resources available that are not being maximized or promoted." Many respondents commented on the significant impact these other programs have had, and felt TAES should emphasize these programs rather than create another initiative: "We would do well in expanding our IPM, Earth-Kind, Rainwater Harvesting and all 'Earth Friendly' programming and market/promote these to Texans before adding new programming."

Objective Five: Implications

Respondents had an ambivalent attitude towards TAES' involvement in OA, which supports research that found the extension services in several states to not be providing information on OA (Agunga, 1995; Creamer, Baldwin, & Louws, 2000; Lohr & Park, 2003; Rodriguez, Molnar, Fazio, Sydnor, & Lowe, 2008; Wheeler, 2007). Lohr and Park (2003) found a difference in institutional support by geographical region, with organic farmers in the southern and north central U.S. more likely to perceive extension as a barrier to OA. Walker (2009) as well as this researcher received comments from organic farmers in Texas noting the lack of support from extension in OA. As some

respondents indicated, people interested in OA have had to rely on other sources for information on OA. Numerous farmer-based organizations have developed to support organic farmers. Creamer, Baldwin, and Louws (2000) integrated organic farmers into CEA training to reduce any misperceptions or animosity between extension and organic farmers. TAES and CEA should work with organic farmers and organic farmer-based organizations to develop collaborations as a way to increase their involvement in OA. Both Agunga (1995) and Conner and Kolodinsky (1997) stated extension will need to determine if their role is to support or advocate alternative agriculture. Respondents from this research thought TAES' role was to support, not advocate.

This research found that respondents were ambivalent toward TAES' role related to OA, and thought TAES should not advocate OA. Respondents also did not perceive any relative importance to TAES providing information on OA, thus are not likely to increase their programming in OA unless they receive more demand from their county or TAES administration. Paulson (1995) concluded:

> The SARE training projects and other attempts to involve extension institutions in sustainable agriculture must present a convincing case for an alternative vision of agriculture. Many agents remain unconvinced or unclear about that vision, while seeing no irresolvable problems with the current system and trends. (p. 127)

Objective Six: Conclusions

The sixth objective was to determine what significant relationships exist between CEA personal characteristics, interest in training, and perceptions of OA, and perceptions of TAES capabilities and role related to OA.

Respondents' perception of OA had a significant positive relationship with their county's change in interest and current level of interest in OA, interest in training, and perception of TAES role in OA. Perception of OA had a significant negative relationship with the number of years respondents had been employed by TAES. Respondents' perceptions of TAES' role in OA had the same relationships as perceptions of OA, except that perceived role was not related with the number of years a respondent had been employed by TAES. Interest in training had a significant negative relationship with years employed by TAES.

Objective Six: Implications

The significant relationship between respondents' perception of OA and the perceived change in level and current level of interest in OA in their respective counties may reflect a difference in receptivity to requests in information in OA. Previous studies described the history of animosity between LGUS on the one side and alternative agriculture organizations and farmers practicing alternative agriculture on the other side (Agunga, 1995; Creamer, Baldwin, & Louws, 2000). In Hassanein's (1999) ethnography of two farmer-based alternative agriculture organizations in Wisconsin, members of the organizations indicated an aversion toward LGUS but noted they were willing to work

with certain faculty and CEA who were more receptive to alternative agriculture. This may also explain the significant relationship between respondent's perception of OA, their perception of TAES role and involvement in OA, and their interest in training in OA. CEA training must take this into account, as the training must not only focus on content but on CEA's attitudes as well. This would be a major undertaking as this would mean trying to change CEA's paradigm. Agunga (1995) suggested for any real significant change, it should start with the incorporation of SA into undergraduate curriculum and agricultural education courses.

Objective Seven: Conclusions

The seventh objective was to determine which, if any, variables predict CEA's perceptions of OA. The following variables were included in the regression: age, gender, population density of county, and years employed by TAES. The only variable that accounted for a significant amount of the variance in respondents' perception of OA was years employed by TAES.

Objective Sevent: Implications

These results were similar to previous studies, which found no statistically significant difference in perceptions of SA by any of the demographic variables (Jayaratne, Martin, & DeWitt, 2000; Sisk, 1995). In their model of reasoned action, Ajzen and Fishbein (1980) indicated numerous variables that influenced an individual's

behavior including demographics and personality traits, but that they did not consistently explain an individual's behavior.

This research study did not include questions on educational background of respondents as TAES requires all CEA to have a master's degree. Sisk's (1995) study examined if there were any significant differences in CEA's perceptions of SA by age, farming experience, educational background, or type of institution employed by. He found there was only a statistically significant difference in perceptions of SA by age with CEA less than 33 more likely to support concepts of SA.

Objective Eight: Conclusions

The eighth objective was to determine which, if any, variables predict CEA's perception of TAES' involvement in OA. The only variable that accounted for a significant amount of the variance in respondents' perception of TAES' involvement in OA was the respondent's gender.

Objective Eight: Implications

The implications of this finding are similar to the previous finding. Certain personality traits and demographic variables may influence an individual's attitude but not enough to explain any significant amount of variance. Sisk (1995) looked to see if there were any statistically significant differences in respondents' perceptions of Cooperative Extension Service's capabilities related to SA by respondent personal characteristics, and found there were significant differences between type institution

employed by, farming background, primary clientele, and undergraduate and graduate major. Sisk (1995) reported that CEA were more likely to agree with perceived capabilities of the Cooperative Extension Service if they were from 1890 institutions, had a farming background, and their primary clientele were small farmers. He also found CEA with an undergraduate or graduate degree in plant science were more likely to disagree with perceived capabilities of Cooperative Extension Service in relation to SA than CEA with other degrees.

Objective Nine: Conclusions

The ninth objective was to determine which, if any, variables predict CEA's level of interest in training in OA. The multiple regression generated three models with the one explaining the most variance in respondents' interest in OA being respondents' perception of OA, their perception of TAES' involvement in OA, and the perceived current level of interest in OA.

Objective Nine: Implications

These findings support Ajzen and Fishbein's (1980) model that an individual's attitude toward that behavior, the individual's perceptions of peers' attitude toward that behavior, and the perceived relative importance of that behavior all influence an individual's intent to perform that behavior. If respondents did not have a positive attitude toward OA, did not have a positive attitude toward TAES involvement in OA, and did not perceive any relative importance from their constituents for information on

OA, they were not as likely to be interested in participating in training on OA. The implications of this are significant. CEA's perception of OA, their perception of TAES' involvement and role in OA, and the perceived level of demand for information on OA will determine an individual's interest in participating in training on OA.

Respondents indicated a neutral attitude toward OA. Comments from respondents indicated some respondents did not perceive OA to be economically viable or science-based. Many comments from respondents also were related to TAES role in relation to OA. Some respondents indicated TAES was not perceived as a source for information on OA, and people interested in OA have found other sources of information. Other respondents felt there was not enough demand to justify allocating TAES resources to OA. Respondents also indicated TAES' role was never to advocate OA, but only to support OA. While respondents acknowledged demand for information on OA is increasing, they did not currently perceive demand for information on OA to be very high; thus, CEA did not perceive any relative importance to increasing their level of training.

While TAES may increase the resources on OA available to CEA, this would not increase TAES' involvement in OA. In order to increase TAES' capabilities and involvement in OA, TAES will need to increase the relative importance of that information. For there to be any significant change in the advancement of OA, there will need to be a paradigm shift in LGUS. In the past decade perceptions of OA at LGUS have begun to shift (Lotter, 2003; Sooby, 2003). Federal funding for OA has drastically

increased, increasing the amount of research and outreach being conducted on OA (Constance & Choi, 2010).

Objective Ten: Conclusions

The tenth objective was to determine if any statistically significant differences exist between personal characteristics on the primary variables of interest. The two personal characteristic that had a statistically significant difference among the variables were gender and population density of respondents' respective counties. There was a statistically significant difference between males and females in their perception of TAES' involvement in OA, with women having a more positive perception of TAES' involvement than men. There was also a difference between genders on their interest in training, with women expressing a higher level of interest.

There was also a statistically significant difference in interest in training by the population density of respondents' counties. Respondents from urban counties had a significantly higher level of interest in training in OA than respondents from rural counties.

Objective Ten: Implications

The findings from this study and previous studies provide few conclusive links between personal characteristics and perceptions of OA or extension's involvement in OA. This study and the study conducted by Jayaratne, Martin, and DeWitt (2000) found no statistically significant differences in perceptions of SA or OA by any of the

demographic variables. Sisk's (1995) study found there was only a statistically significant difference in perceptions of SA by age with CEA less than 33 more likely to support concepts of SA. Sisk (1995) also found statistically significant differences in perceptions of extension's capabilities by several variables, but not gender, while this study found a statistically significant difference between perceptions of TAES' involvement and interest in training in OA by gender only. This supports Ajzen and Fishbein's (1980) model that while personal characteristics may influence behavior, they do not consistently account for a significant amount of variance.

Recommendations for Application

Based on the findings of this research and previous studies, it is suggested that:

1. Different trainings directed at different audiences may be required. Because IPM and NR CEA reported they were not responsible for information on OA, the perceived relative importance of participating in training would be lacking, which would impact their receptivity and readiness to learn. Conner and Kolodinsky (1997) also noted CEA with more knowledge on OA could serve as mentors for other CEA.

2. As explained in the conceptual model, three factors influence CEA's interest in participating in training on OA. Since CEA had an ambivalent attitude toward OA and did not perceive much demand for information on OA, the relative importance of training and programming in OA will be limited. TAES

administration will need to advocate an increase in OA training and programming if TAES is to increase activity in this area.

3. Previous research reported organic farmers were utilizing alternative sources and organizations for information on OA (Hassanein, 1999; Kloppenburg, 1991; Walz, 1999). CEA should try to collaborate with these organic farming networks and organizations and establish relationships. CEA should also acknowledge and utilize the local knowledge of organic farmers, thus expanding the knowledge base on organic practices and acknowledging the adult learner's experiences.

4. A large percentage of CEA programming is directed at gardeners and the Texas Master Gardener program. As CEA noted one of their primary audiences for information on OA is gardeners, the TAES Organic Working Group's efforts should focus on creating training and resources on organic gardening for CEA and the Texas Master Gardener program.

5. Many CEA commented that TAES already has many programs with parallel goals as OA (IPM, EarthKind, rainwater harvesting, etc.), and expressed a reluctance to promote another program or initiative. Thus, some OA practices could be incorporated into other current TAES programs.

6. Alternative agricultural systems require CEA to learn a new way of thinking and teaching, thus CEA training on OA would need to focus not only on content, but also on attitude and educational methods. Jayaratne, Martin, and DeWitt (2001) argued that CEA training on alternative agriculture should not only teach subject matter but also focus on educational delivery as it is not merely diffusion of an innovation but an educational process.

7. The most frequently cited form of prior training on OA was self-directed learning and the fourth most cited selection was no training in OA. Less than 7% indicated they had taken university courses in OA. OA and SA need to be incorporated into undergraduate and graduate agriculture and agricultural education courses to provide future CEA a basis for delivering information.

8. The purpose of the extension service is to disseminate research from the LGUS to constituents in their respective counties. If there is no research being conducted on OA at the LGUS, CEA's hands are tied, restricting what information they can provide. As Creamer, Baldwin and Louws (2000) noted the lack of research on OA limits CEA's ability to disseminate information on OA. Thus, for there to be any significant change in the advancement of OA, there will need to be a paradigm shift in the LGUS.

Recommendations for Future Research

This research examined CEA's perception of the relative importance of information on OA, perceptions of OA, perceptions of TAES' role and involvement in OA, participation in prior training and interest in future training. It is recommended that this research be conducted in other states to examine regional differences. Further research should also be conducted in Texas to determine other potential opportunities/barriers to the diffusion and adoption of OA, including:

1. Examine CEA's level of knowledge of OA in order to determine how it influences their perceptions of OA,
2. Determine TAES administration's perceptions of OA and TAES' role in OA in order to determine the perceived relative importance of CEA providing programming CEA,
3. Determine Texas organic farmers' perceptions of TAES and its role and involvement in OA in order to determine what barriers CEA may encounter when trying to establish relationships with organic farmers,
4. Determine the current sources of information utilized by Texas organic farmers and the level of trust they have for each source,
5. Determine if there is an interest in OA in the 4-H, Texas Junior Master Gardener, and Texas Master Gardener programs,
6. Determine LGUS research faculty's involvement in OA,
7. Determine LGUS research faculty's perceptions of OA and how it influences their involvement in conducting research in OA,

8. Determine what barriers exist for LGUS research faculty in conducting research in OA,
9. Determine LGUS teaching faculty's involvement in OA,
10. Determine LGUS teaching faculty's perceptions of OA and how it influences their involvement in integrating OA into their curriculum,
11. Determine the perceived barriers to incorporating OA into undergraduate and graduate curriculum.

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APPENDIX A

An Assessment of Texas AgriLife Extension's Need for Information on

Thank you for participating in this survey. This research is an initiative from the Texas AgriLife Extension working group on organic agriculture in collaboration with a doctoral student in the Agricultural Education department.

The purpose of this survey is to assess extension agents' need for information on organic agriculture. Information gathered in this survey will be used to develop resources for extension agents to serve the needs of Texans interested in organic agriculture.

Your input is vital to understanding and serving the needs of all Texans, so please complete this questionnaire. All responses will be kept confidential.

For more information about this survey or the research being conducted, contact Patrick Lillard (979-845-8567, ptlillard@ag.tamu.edu), Dr. Joe Masabni (jmasabni@ag.tamu.edu), or Dr. James Lindner (979- 458-2701, j-lindner@tamu.edu).

This survey uses the definition of organic agriculture developed by the National Organic Program of the USDA: "a system that... respond[s] to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity."

1. For survey respondent verification, please enter your 10 digit office phone number.

2. Over the past five years, the level of interest in growing organically in my county has:

- ◯ Significantly Decreased
- ◯ Decreased
- ◯ Stayed the same
- ◯ Increased
- ◯ Significantly Increased
- ◯ There has been no interest
- ◯ I do not know

3. What is the current level of interest in growing organically in your county?

	No Demand	Extremely low	Low	Moderate	High	Extremely high
Level of Interest	◯	◯	◯	◯	◯	◯

An Assessment of Texas AgriLife Extension's Need for Information on

4. How often do you provide information on organic agriculture (presentations, emails, phone calls, etc.)?

- ◯ Never
- ◯ Rarely - Less than once a month
- ◯ Occasionally - One to two times a month
- ◯ Commonly - At least once a week
- ◯ Very often - Daily

5. If you answered yes to the previous question, who is your primary audience(s) for that information?
(Check all that apply)

- ☐ Not applicable
- ☐ Full time farmers/ranchers
- ☐ Part time farmers/ranchers
- ☐ Gardeners
- ☐ Homeowners
- ☐ Consumers
- ☐ Other extension agents

An Assessment of Texas AgriLife Extension's Need for Information on

6. What experience or training have you had related to organic agriculture? (Check all that apply)

- [ ] None
- [ ] Personal experience
- [ ] Self directed learning
- [ ] University/college course
- [ ] University/college workshop
- [ ] Industry workshop
- [ ] Professional conference
- [ ] Working with producers using organic agricultural practices
- [ ] On-the-job/in-service training
- [ ] Other (please specify) _____

7. Please indicate your level of confidence in providing information and programming on organic agriculture.

- ◯ I am extremely UNCONFIDENT answering even general questions on organic agriculture.
- ◯ I am slightly UNCONFIDENT answering questions on organic agriculture.
- ◯ I am slightly CONFIDENT answering questions on organic agriculture.
- ◯ I am EXTREMELY CONFIDENT answering even specific questions on organic agriculture.
- ◯ I refuse to answer questions on organic agriculture.

An Assessment of Texas AgriLife Extension's Need for Information on

8. Please indicate how useful the following sources of information would be to you using the following scale:
- Not at all useful
- Not very useful
- Somewhat useful
- Very useful

	Not at all useful	Not very useful	Somewhat useful	Very useful
Website with organic information	◯	◯	◯	◯
Printable organic publications online	◯	◯	◯	◯
Online training modules for agents	◯	◯	◯	◯
Extension workshop	◯	◯	◯	◯
Protocol for organic demonstration/trial plots	◯	◯	◯	◯
Extended training for college credit	◯	◯	◯	◯
Field days at organic farms	◯	◯	◯	◯

Other (please specify)

An Assessment of Texas AgriLife Extension's Need for Information on

9. Please indicate your level of interest in participating in training on the following practices, using the following scale:
- Strongly Disagree (SD)
- Disagree (DA)
- Neither Disagree nor Agree (ND)
- Agree (A)
- Strongly Agree (SA)

I am interested in participating in training on:

	SD	D	ND	A	SA
Organic agriculture in general	◯	◯	◯	◯	◯
Organic agricultural production systems	◯	◯	◯	◯	◯
Transitioning to organic agriculture	◯	◯	◯	◯	◯
Organic disease management	◯	◯	◯	◯	◯
Organic insect management	◯	◯	◯	◯	◯
Organic weed management	◯	◯	◯	◯	◯
Organic soil fertility management	◯	◯	◯	◯	◯
Organic certification	◯	◯	◯	◯	◯
Marketing organic products	◯	◯	◯	◯	◯

Other (please specify)

_____

An Assessment of Texas AgriLife Extension's Need for Information on

10. Please indicate your level of agreement or disagreement with the following statements regarding organic agriculture, using the following scale:

- Strongly Disagree (SD)
- Disagree (D)
- Neither Disagree nor Agree (ND)
- Agree (A)
- Strongly Agree (SA)

	SD	D	ND	A	SA
Most organic agricultural practices can be successfully implemented in my county.	◯	◯	◯	◯	◯
Agricultural systems using crop rotations, green manure crops, and animal manures can be economically comparable to a traditional system that uses synthetic fertilizers.	◯	◯	◯	◯	◯
Chemical residues on many fruits and vegetables pose a significant risk to the consumer.	◯	◯	◯	◯	◯
Organic agriculture is a niche market that will never be a major component of U.S. agriculture.	◯	◯	◯	◯	◯
Most insects can be successfully managed without the use of synthetic insecticides.	◯	◯	◯	◯	◯
Most plant diseases can be successfully managed without the use of synthetic fungicides.	◯	◯	◯	◯	◯
Most weeds can be successfully managed without the use of synthetic herbicides.	◯	◯	◯	◯	◯
Crops, with the potential for sustaining or increasing production with limited inputs, should receive more research emphasis.	◯	◯	◯	◯	◯
Organic pest control methods would reduce the amount of pesticides used, which would contribute to the reduction of pesticide pollution.	◯	◯	◯	◯	◯
Many organic practices that are used successfully in other states, will not work in Texas.	◯	◯	◯	◯	◯

An Assessment of Texas AgriLife Extension's Need for Information on

11. Please indicate your level of agreement or disagreement with the following statements concerning the role of extension in areas of organic agriculture, using the following scale:

- **Strongly Disagree (SD)**
- **Disagree (D)**
- **Neither Disagree nor Agree (ND)**
- **Agree (A)**
- **Strongly Agree (SA)**

	SD	D	ND	A	SA
Texas AgriLife Extension Service provides the major leadership in areas of organic agriculture in my county.	◯	◯	◯	◯	◯
Texas AgriLife Extension Service has ignored organic farmers way too much in the past.	◯	◯	◯	◯	◯
Texas AgriLife Extension Service has provided adequate training for extension agents in areas of organic agriculture.	◯	◯	◯	◯	◯
It is not the job of Texas AgriLife Extension Service to provide information on organic agriculture.	◯	◯	◯	◯	◯
Texas AgriLife Extension Service currently has the capabilities needed to meet the educational needs on organic agriculture.	◯	◯	◯	◯	◯
My supervisors would be supportive of me increasing my amount of programming on organic agriculture.	◯	◯	◯	◯	◯
More time and adequate funding should be set aside for training in the area or organic agriculture.	◯	◯	◯	◯	◯
Texas AgriLife Extension Service should do more to support organic farmers.	◯	◯	◯	◯	◯

An Assessment of Texas AgriLife Extension's Need for Information on

12. What is your age?

- ◯ 20-30
- ◯ 31-40
- ◯ 41-50
- ◯ 51-60
- ◯ Over 60

13. What is your gender?

- ◯ Male
- ◯ Female

14. How many years have you worked for the Texas AgriLife Extension Service?

Years _____

15. What type of extension agent position do you hold?

- ◯ Agriculture (AG)
- ◯ Agriculture & Natural Resources (AG/NR)
- ◯ Horticulture (HORT)
- ◯ Integrated Pest Management (IPM)
- ◯ Natural Resources (NR)
- ◯ Other (please specify)

16. Are you the primary agent responsible for information related to organic agriculture in your county?

- ◯ Yes
- ◯ No

17. My county is primarily:

- ◯ Urban
- ◯ Suburban
- ◯ Rural

An Assessment of Texas AgriLife Extension's Need for Information on

18. If you have any suggestions or comments you would like to add, please include them here.

APPENDIX B

Texas A&M University Email Collabora_on Suite ptlillard@neo.tamu.edu
Fwd: RE: Permission to use Sisk ques_onnaire Tuesday, August 17, 2010 10:25:16 AM
From: ptlillard@ag.tamu.edu
To: ptlillard@gmail.com; ptlillard@tamu.edu

Patrick Lillard
Extension Assistant
Texas Agrilife Extension Service
Texas A&M University
TAMU 2134
College Station, TX 77843-2134
ph: (979)845-8567

>>> "Joe W Kotrlik" <kotrlik@lsu.edu> 8/11/2010 10:15 AM >>>
Patrick, Dr. Jerry Sisk, the Ph.D. student who originally designed that questionnaire, died unexpectedly several years ago. As the chair of his Ph.D. committee, I know he would be happy for you to use his questionnaire. Since I do not know of anyone else closer to this research, I give my permission for you to use this instrument in your research with the requirement that you give appropriate credit to the source of the instrument. Best of luck with your study.

Joe Kotrlik, J. C. Atherton Alumni Professor
LSU School of Human Resource Education & Workforce Development
Louisiana State University, Baton Rouge, LA 70803-5477
225.578.5753 / kotrlik@lsu.edu

-----Original Message-----
From: Patrick Lillard [mailto:ptlillard@ag.tamu.edu]
Sent: Tuesday, August 10, 2010 4:50 PM
To: Joe W Kotrlik
Subject: Permission to use Sisk questionnaire
Dr. Kotrlik,
As the major advisor for Dr. Jerry Sisk, I am writing to request your permission to use the questionnaire from his dissertation. My supervisor, an extension vegetable specialist, and I are wanting to

survey Texas extension agents on their perceptions of organic agriculture and their informational needs related to that area. This information will help us determine the information and resources related to organic agriculture needed most by extension agents. I have reviewed many instruments, and while Dr. Sisk's questionnaire focuses on sustainable agriculture, after a few changes I believe it would be the best instrument to collect the data we want. Thank you for your time.

Patrick Lillard
Patrick Lillard
Extension Assistant
Texas Agrilife Extension Service
Texas A&M University
TAMU 2134
College Station, TX 77843-2134
ph: (979)845-8567

APPENDIX C

TEXAS A&M UNIVERSITY
DIVISION OF RESEARCH AND GRADUATE STUDIES - OFFICE OF RESEARCH COMPLIANCE

1186 TAMU, General Services Complex
College Station, TX 77843-1186
750 Agronomy Road, #3500

979.458.1467
FAX 979.862.3176
http://researchcompliance.tamu.edu

Human Subjects Protection Program — Institutional Review Board

DATE: 26-Oct-2010

MEMORANDUM

TO: LILLARD, PATRICK

FROM: Office of Research Compliance
Institutional Review Board

SUBJECT: Amendment

Protocol Number: 2010-0636

Title: An Assessment of Texas AgriLife Extension's Need for Information on Organic Agriculture

Review Category: Exempt from IRB Review

It has been determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Provisions: Modified the survey instrument

This electronic document provides notification of the review results by the Institutional Review Board.

VITA

Name: Patrick Terrell Lillard

Address: 107 Scoates Hall
2116 TAMU
College Station, TX 77843-2116

Education: B.A., English, Texas A&M University at College Station, 2000

M.S., Horticulture, Texas A&M University at College Station, 2008

Ph.D., Agricultural Leadership, Education and Communications,
Texas A&M University at College Station, 2011